REMINGTON
MODEL 99
CALCULATOR

INSTRUCTION MANUAL

Remington Rand
DIVISION OF SPERRY RAND CORPORATION
315 PARK AVENUE SOUTH, NEW YORK 10, N.Y.

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FOREWORD

THIS INSTRUCTION BOOK IS INTENDED PRIMARILY FOR MECHANICS; HOWEVER, IT CAN BE STUDIED TO A VERY GOOD ADVANTAGE BY SALESMEN.

THIS BOOK IS NOT AN OPERATOR'S INSTRUCTION BOOK AND SHOULD NOT BE GIVEN TO CUSTOMERS.

THE DRAWINGS CONTAINED IN THIS BOOK SHOULD BE STUDIED IN CONNECTION WITH THE WRITTEN INSTRUCTIONS AND ARE OF GREAT ASSISTANCE IN LEARNING THE FUNCTIONS AND ADJUSTMENTS OF THE VARIOUS MECHANICAL UNITS.

FOR THOSE IN THE FOREIGN FIELD WHO DO NOT READ ENGLISH, A CAREFUL STUDY OF THE DRAWINGS WILL GIVE HELPFUL FUNDAMENTAL INFORMATION.

STUDY ONE UNIT THOROUGHLY BEFORE GOING ON TO ANOTHER

TO OBTAIN THE BEST RESULTS, LEARN THE ADJUSTMENTS WHICH PERTAIN TO ONE UNIT FROM THE BOOK, THEN MAKE THEM ON THE MACHINE.

PRINTED IN U. S. A.

MODEL 99 PRINTING CALCULATOR

INSTRUCTION MANUAL

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Model 99 Printing Calculator

INTRODUCTION

The Model 99 Printing Calculator was engineered, developed and designed to SIMPLIFY and SPEED UP every phase of calculating machine operation. To develop this AUTOMATIC PRINTING CALCULATOR, the laboratory has spared no expense.

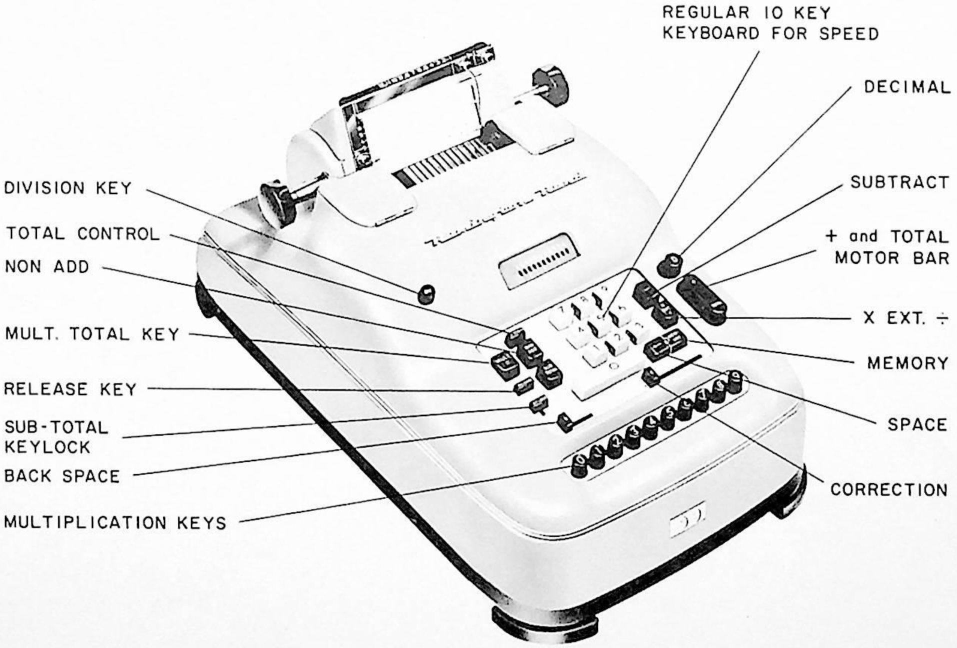
Even after the laboratory finished developing the "99", the factory has spared no expense in purchasing and in producing the finest precision tools and dies in order that the parts that go into this "99 Printing Calculator" will be held to closer tolerances than ever before heard of in office equipment manufacturing.

Precision made parts mean quality built right into the product. This means less down-time, fewer adjustments necessary and a general over-all saving to Remington Rand as well as to our customers. Below are a few of the important improvements incorporated in this machine.

I	Automatic Multiplication
II	Automatic Short-Cut Multiplication
III	Accumulative Multiplication
IV	Simpla-Tape
V	Automatic Credit Balance
VI	Mult Total Key

I Automatic Multiplication

Automatic multiplication is performed in the following manner: Enter the multiplicand in the keyboard. Then depress the space key one time for each digit in the multiplier, less one. After the multiplicand is entered in the keyboard, multiplication may be performed automatically by depressing the multiply keys representing the value of each digit in the multiplier. The keys are depressed in the same order as you would read the multiplier. The answer will be printed automatically and the machine will be clear and ready for the next operation.



INTRODUCTION (CONT'D)

RELEASE KEY (USAGE)

IN CASES WHERE IT IS DESIRED TO CLEAR THE MACHINE BEFORE THE PROBLEM IS COMPLETED OR BEFORE ALL SPACES HAVE BEEN BACKSPACED OUT OF THE STOP SECTION, THE RELEASE KEY SHOULD BE PULLED FORWARD PRIOR TO THE DEPRESSING OF THE LAST MULTIPLIER DIGIT.

EXTEND KEY (APPLICATION)

THE EXTEND KEY IS USED IN MULTIPLICATION WHEN THE COMBINED DIGITS OF THE MULTIPLICAND AND MULTIPLIER EXCEED THE LISTING CAPACITY OF THE MACHINE. FOR EXAMPLE, WHEN MULTIPLYING BY A THIRTEEN (13) DIGIT MULTIPLIER, LATCH DOWN THE EXTEND KEY AND MULTIPLY IN THE USUAL MANNER, RELEASING THE EXTEND KEY BEFORE THE LAST MULTIPLIER. THE MACHINE WILL CLEAR AUTOMATICALLY AND THE ANSWER WILL BE ACCURATE FOR THE FIRST ELEVEN (11) DIGITS COUNTING FROM THE LEFT. DO NOT DEPRESS THE RELEASE KEY IF THE EXTEND KEY IS LATCHED DOWN.

THE EXTEND KEY IS ALSO USED IN DIVISION WHEN IT IS DESIRED TO CARRY A PROBLEM OUT FARTHER THAN THE SPACES INDEXED IN THE STOP SECTION WOULD PERMIT. THERE ARE MANY OTHER USES OF THE EXTEND KEY AS EXPLAINED IN OUR SALES DEPARTMENT'S OPERATOR'S MANUAL.

II SHORT-CUT MULTIPLICATION

SHORT-CUT MULTIPLICATION ON THE MODEL 99 PRINTING CALCULATOR IS PERFORMED AUTOMATICALLY WHEN MULTIPLY KEYS 6 THROUGH 9 ARE USED. REMEMBER, NO OTHER KEYS TO DEPRESS. MECHANICALLY, THE OPERATION IS PERFORMED SIMILARLY TO THE MODEL 98 AND WILL BE EXPLAINED LATER.

III ACCUMULATIVE MULTIPLICATION

THIS FEATURE IS PERFORMED ON THE MODEL 99 PRINTING CALCULATOR BY MOVING THE TOTAL CONTROL LEVER. WITH THE TOTAL CONTROL LEVER POSITIONED TO THE LEFT, THE MACHINE WILL BE PREVENTED FROM TOTALING AUTOMATICALLY AFTER EACH MULTIPLICATION OPERATION; THEREFORE, A SERIES OF MULTIPLICATION OPERATIONS CAN BE PERFORMED AND A GRAND TOTAL OF ALL THE OPERATIONS MAY BE OBTAINED. PRIOR TO MULTIPLYING THE LAST DIGIT OF THE SERIES OF OPERATIONS, THE TOTAL CONTROL LEVER SHOULD BE MOVED TO THE RIGHT AND THE GRAND TOTAL WILL BE PRINTED AUTOMATICALLY.

IV MULT TOTAL KEY (USAGE)

THE MULT TOTAL KEY SIMPLIFIES MULTIPLICATION BY ALLOWING OPERATOR TO USE SPACE AND MEMORY KEYS TO SET SPACES TO RIGHT OF MULTIPLICAND IN PREFERENCE TO MENTALLY INDEXING MULTIPLICAND DIGITS AND THEN DEPRESSING SPACE KEY FOR EACH SPACE DESIRED FOR VARIOUS MULTIPLIERS. A MECHANISM FOR ELIMINATING ZERO PRINT TO RIGHT OF PRODUCT ON TOTAL OPERATION IS ALSO INCLUDED WITH THIS FEATURE. THE MULT TOTAL OPERATION WILL BE EXPLAINED LATER IN THE TEXT OF THIS BOOK.

V PRINTING CONTROL FEATURE - SIMPLA-TAPE

THIS FEATURE PERMITS THE ESSENTIAL FACTORS AND RESULTS ONLY TO BE PRINTED ON THE TAPE. FOR EXAMPLE, IN MULTIPLICATION, THE MULTIPLICAND IS PRINTED ONLY ONCE; NO REPETITION OF PRINTING, AFTER EACH BACKSPACE OPERATION. THE MULTIPLIER IS PRINTED AND THE ANSWER, OR PRODUCT, IS ALSO PRINTED. IN DIVISION, THE DIVISOR IS PRINTED ONLY ONCE, AS WELL AS THE QUOTIENT AND REMAINDER BEING PRINTED.

INTRODUCTION (CONT'D)

VI CREDIT BALANCE

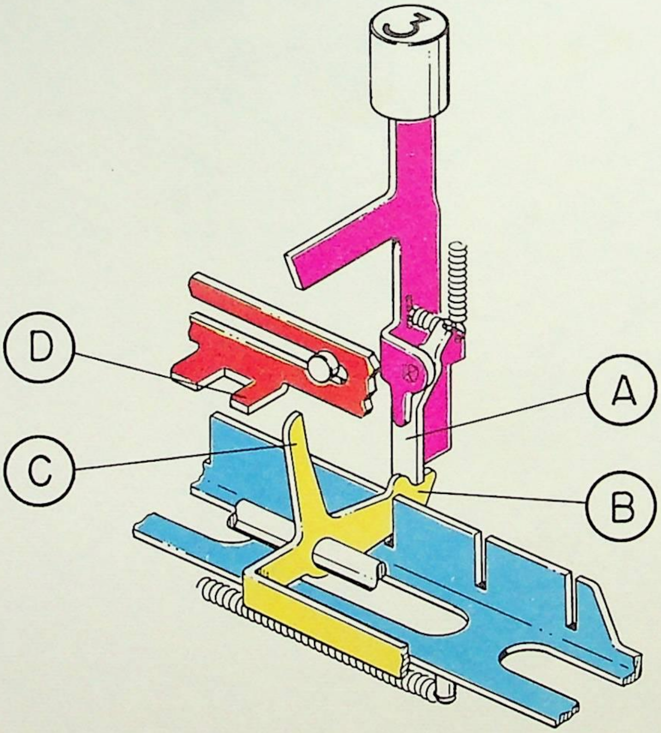
CREDIT BALANCE IS PERFORMED MECHANICALLY IN PRACTICALLY THE SAME MANNER AS ON PREVIOUS MACHINES. THE CREDIT BALANCE MECHANISM IS DISENGAGED WHEN THE MACHINE GOES INTO A DIVISION OPERATION; THEREFORE, A ONE WILL NOT BE CARRIED INTO THE UNITS RACK WHEN THE MACHINE CARRIES.

THE DIVISION OPERATION HAS NOT CHANGED BASICALLY. THERE IS ADDED LINKAGE TO PERFORM DIFFERENT FUNCTIONS, SUCH AS INTERLOCKS, ETC. THIS INFORMATION WILL BE EXPLAINED LATER IN THE TEXT OF THIS BOOK.

MULTIPLY KEYSTEM YIELDING PAWL

AS A MULTIPLY KEY IS DEPRESSED, THE YIELDING PAWL (A) RIVETED TO THE KEYSTEM WILL CONTACT THE MULTIPLY KEYSTEM OPERATING BELLCRANK EXTENSION (B) ACTUATING THE BELLCRANK ASSEMBLY DOWNWARD AND AT THE SAME TIME POSITIONING EXTENSION (C) IN PATH OF (D) AS SHOWN IN SKETCH.

WHEN THE KEYSTEM BELLCRANK OPERATING SLIDE EXTENSION (D) CONTACTS EXTENSION (C), MOVING IT TO THE RIGHT, IT RELEASES THE BELLCRANK EXTENSION (B) FROM THE PAWL, AFTER WHICH, EXTENSION (B) MOVES UPWARD AND UNDER SPRING TENSION IS PULLED TO THE LEFT. AT THE SAME TIME, EXTENSION (C) MOVES FORWARD, UNLATCHING FROM LIP (D). INASMUCH AS THE KEYSTEM DOES NOT RESTORE UNTIL THE NEXT STROKE, THE PAWL WILL YIELD TO THE LEFT, REMOVING PRESSURE FROM KEYSTEM. KEYSTEM IS NOW FREE TO RESTORE WHEN UNLATCHED.



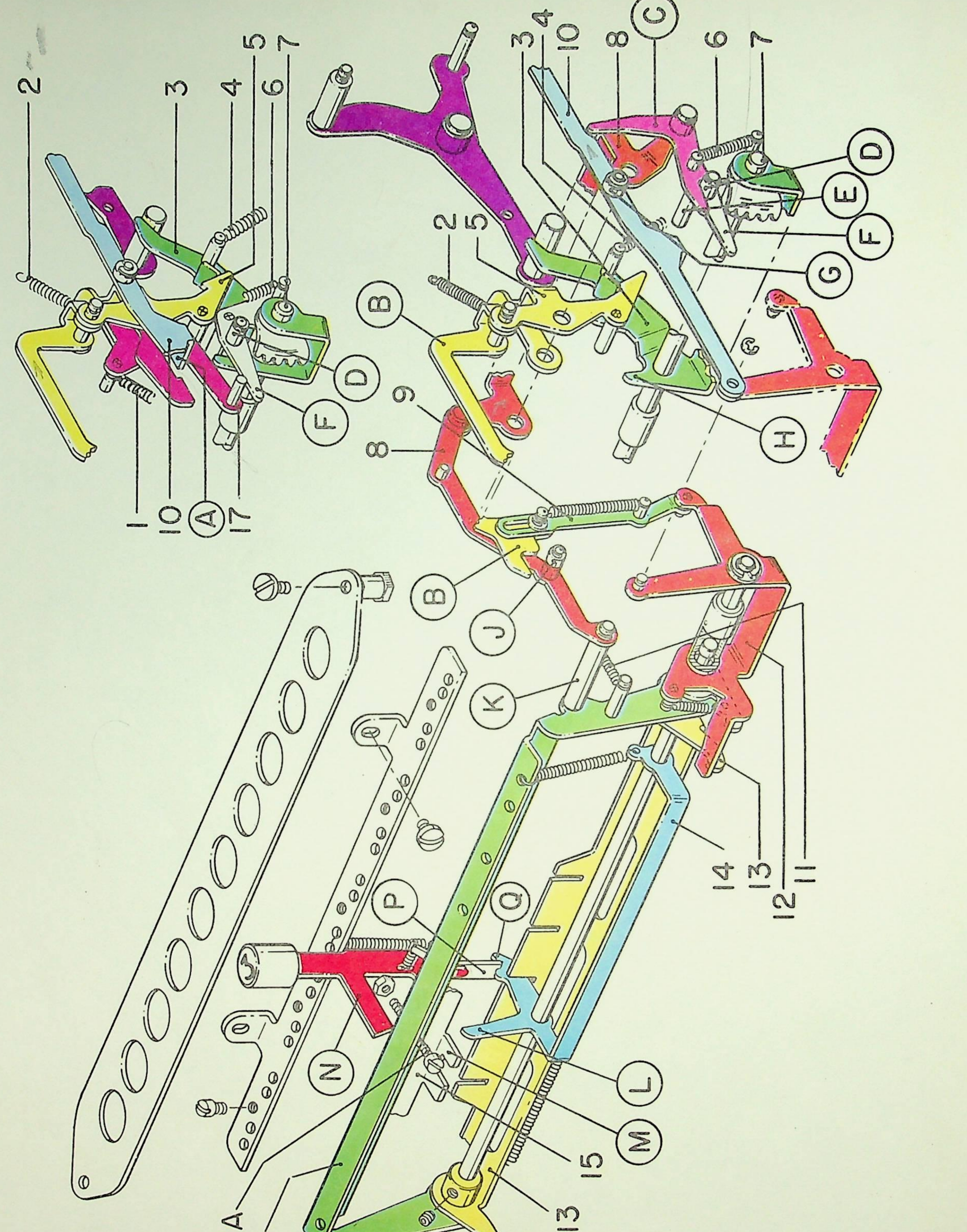


PLATE I

MULTIPLY KEY OPERATION

MECHANICAL OPERATION OF MULTIPLY KEYS 2 THRU 9

PLATES 1, 2 & 3

AS A MULTIPLY KEY IS DEPRESSED, YIELDING PAWL (P) RIVETED TO THE KEYSTEM, DEPRESSES REAR EXTENSION (Q)OF THE KEYSTEM OPERATING BELLCRANK (14) PLATE 1. BELLCRANK (14) WILL ROTATE SO THAT ITS UPPER FRONT EXTENSION (L) IS POSITIONED IN THE PATH OF EXTENSION (M) OF THE KEYSTEM BELLCRANK OPERATING SLIDE (15). KEYSTEM BELLCRANK EXTENSION (Q) ALSO ROTATES THE KEYSTEM BELLCRANK COMB (13) WHICH IN TURN WILL OPERATE THE MOTOR DRIVE CONTROL BELLCRANK (12) AND THE MULTIPLY NON-PRINT BELLCRANK LATCH ACTUATOR (21) PLATE 2.

AS THE MULTIPLY NON-PRINT BELLCRANK LATCH ACTUATOR (21) ROTATES, IT WILL RAISE LINK (20), POSITIONING STEP (R) OF MULTIPLY NON-PRINT BELLCRANK LATCH (19) OUT OF THE PATH OF ROLL (S) ON THE MULTIPLY NON-PRINT BELLCRANK (22). ROLL (U) CONTACTS EXTENSION (V) OF MULTIPLY NON-PRINT BELLCRANK RESTORING ARM PAWL (24) RELEASING STEP (W) FROM ROLL (T) ON MULTIPLY NON-PRINT BELLCRANK RESTORING ARM (23). MULTIPLY MECHANISM OPERATING SLIDE (28) WILL MOVE REARWARD THRU SPRING (29), RELEASING STUD (Z) FROM OPERATING SLIDE RETAINING PAWL LINK BELLCRANK (39) PLATE 3, ALLOWING BELLCRANK (39) TO ROTATE, POSITIONING OPERATING SLIDE RETAINING PAWL LINK (38) TO THE LEFT THRU SPRING (37). LINK (38) WILL RELEASE OPERATING SLIDE RETAINING PAWL (35), PERMITTING IT TO ENGAGE KEYSTEM BELLCRANK OPERATING SLIDE (15) THRU SPRING (36).

WHEN THE MOTOR DRIVE CONTROL BELLCRANK (12) PLATE 1, ROTATES, THE KEYSTEM LOCK PAWL RETAINING LINK (9) WILL MOVE DOWNWARD POSITIONING PAWL (B) IN PATH OF ROLL (J) ON THE KEYSTEM LOCK RELEASE ARM (8). AT THE SAME TIME, UPPER EXTENSION OF BELLCRANK (12) MOVES AUTOMATIC TOTAL AND MOTOR DRIVE CONTROL CONNECTOR LINK (10) TO THE REAR, CAUSING ROLL (G) ON SAME TO RELEASE CONTROL ARM (C) OF KEYSTEM LOCK RELEASE ARM (8) FROM ROLL (D) ON THE GEAR ARM (F) OF THE UNIVERSAL DRIVE SHAFT (7). THIS PERMITS THE KEYSTEM LOCK BAIL (16) AND THE KEYSTEM LOCK RELEASE ARM (8) TO MOVE REARWARD UNDER THE TENSION OF SPRING (11) CARRYING WITH THEM PAWL (B) AND CONTROL ARM LATCH ASSEMBLY (5). THIS, IN TURN, UNLATCHES THE MOTOR DRIVE CONTROL ARM (3) AND, THROUGH THE TENSION OF SPRING (4), OPERATES THE MOTOR. AS THE KEYSTEM LOCK BAIL (16) MOVES REARWARD, IT WILL LATCH OVER EXTENSION (N) OF THE MULTIPLY KEY.

AS THE MACHINE OPERATES, THE UNIVERSAL DRIVE SHAFT (7) PLATE 3, WILL ACTUATE THE OPERATING SLIDE PAWL (34) THROUGH OPERATING SLIDE FEED PAWL ARM (32) AND OPERATING SLIDE FEED ARM PIVOT SHAFT (33) MOVING THE KEYSTEM BELLCRANK OPERATING SLIDE (15) ONE SPACE TO THE RIGHT ON EACH MAIN SHAFT OPERATION, WHERE IT WILL BE LATCHED BY THE OPERATING SLIDE RETAINING PAWL (35).

EXTENSION (Y) OF MULTIPLY NON-PRINT BELLCRANK RESTORING ARM PAWL (24) PLATE 2, CONTACTS STUD (X) OF NON-PRINT BELLCRANK LATCH ACTUATOR (21) PREVENTING STEP (W) FROM RELATCHING ROLL (T). ARM (F) PLATE 1, (INSET) ON UNIVERSAL DRIVE SHAFT (7), MOVING DOWNWARD, PERMITS MULTIPLY MOTOR DRIVE BELLCRANK LATCH (17) TO OVER-LATCH EXTENSION (A) ON CONTROL CONNECTOR LINK (10) THRU SPRING (1).

ON MULTIPLY KEYS 2 THRU 9, EXTENSION (M) CONTACTS EXTENSION (L) ON NEXT TO THE LAST FORWARD STROKE, MOVING THE KEYSTEM OPERATING BELLCRANK (14) TO THE RIGHT, RELEASING EXTENSION (Q) FROM THE KEYSTEM YIELDING PAWL (P). THIS ALLOWS KEYSTEM BELLCRANK COMB (13) TO RESTORE AND, IN TURN, PERMITS THE MULTIPLY NON-PRINT BELLCRANK LATCH ACTUATOR (21) PLATE 2, TO RESTORE. STUD (X) OF BELLCRANK LATCH ACTUATOR (21) RELEASES FROM EXTENSION (Y) OF RESTORING ARM PAWL (24), PERMITTING STEP (W) TO RELATCH ROLL (T) OF NON-PRINT BELLCRANK RESTORING ARM (23) THROUGH SPRING (25). MULTIPLY MOTOR DRIVE BELLCRANK LATCH (17) PLATE 1, (INSET) WILL LATCH EXTENSION (A) ON CONTROL CONNECTOR LINK (10) PREVENTING LINK (10) AND MOTOR DRIVE CONTROL BELLCRANK

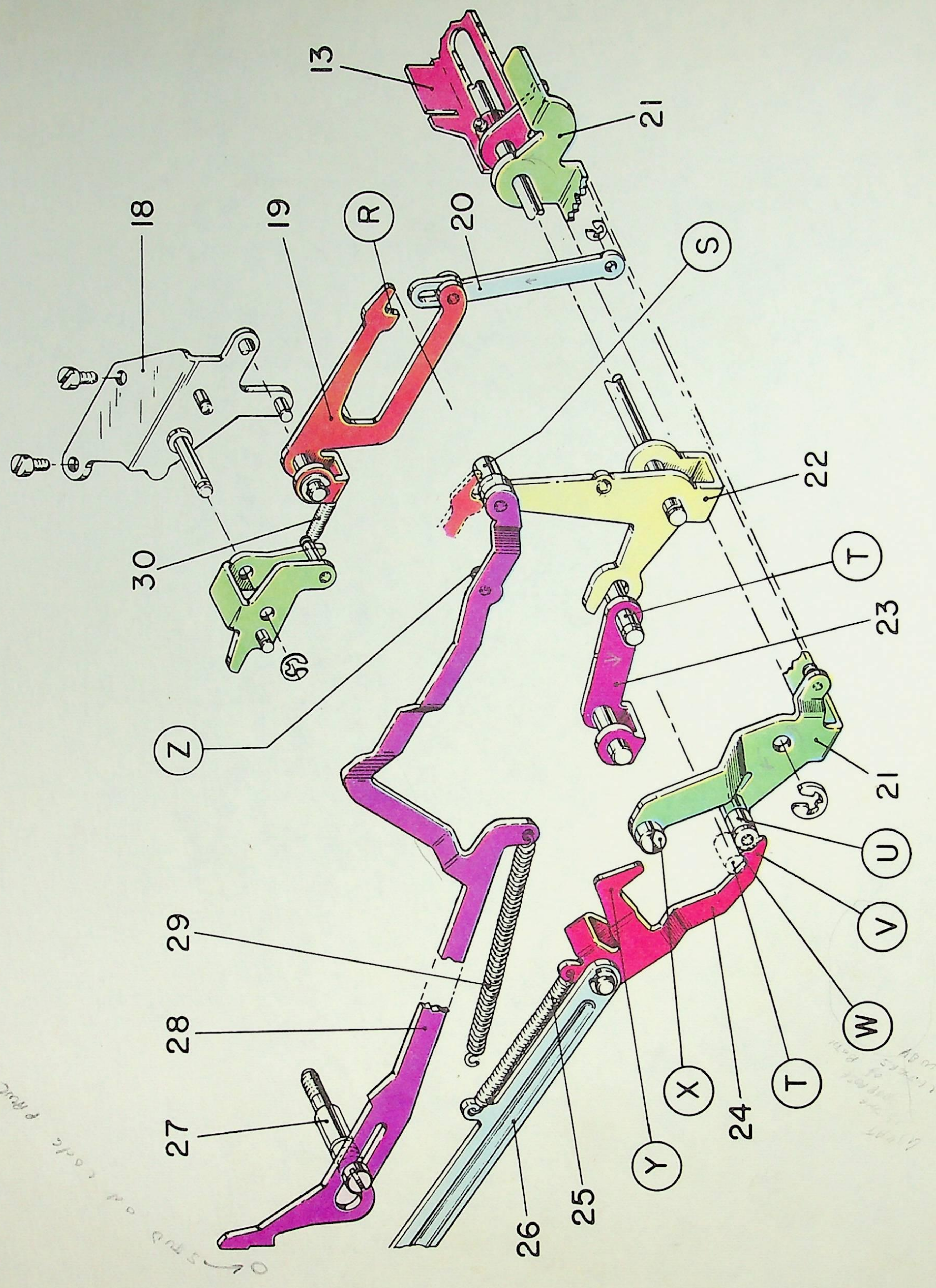


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PLATE 2 MULTIPLY KEY OPERATION

(12) FROM RESTORING. THIS WILL HOLD PAWL (B) BEHIND ROLL (J) ON KEYSTEM LOCK RELEASE ARM (8), PREVENTING MOTOR CONTROL ARM LATCH (5) FROM RELATCHING MOTOR DRIVE CONTROL ARM (3) TO KEEP MOTOR RUNNING FOR LAST STROKE OF MULTIPLIER. ROLL (G) ON CONTROL CONNECTOR LINK (10) WILL HOLD CONTROL ARM (C) ABOVE ROLL (D) PREVENTING KEYSTEM LOCK RELEASE ARM (8) FROM RESTORING WHICH, IN TURN, PREVENTS MULTIPLY KEY FROM RESTORING UNTIL LAST STROKE.

ON NEXT TO THE LAST RETURN STROKE, ARM (F) ON UNIVERSAL DRIVE SHAFT (7) WILL RAISE LATCH (17) RELEASING LINK (10), PERMITTING IT AND BELLCRANK (12) TO RESTORE. AS BELLCRANK (12) RESTORES, LINK (9) WILL MOVE UP, RAISING PAWL (B) FROM BEHIND ROLL (J). THIS WILL PERMIT SPRING (2) TO MOVE LOWER PORTION OF LATCH (5) INTO A LATCHING POSITION OF ARM (3). MULTIPLY NON-PRINT BELLCRANK RESTORING ARM PAWL (24) PLATE 2, RESTORES NON-PRINT BELLCRANK RESTORING ARM (23), RESTORING MULTIPLY NON-PRINT BELLCRANK (22) AND MULTIPLY MECHANISM OPERATING SLIDE (28). STUD (Z) PLATE 3, ON SLIDE (28) WILL CONTACT AND ROTATE BELLCRANK (39) POSITIONING LINK (38) TO THE RIGHT, RELEASING RETAINING PAWL (35) FROM OPERATING SLIDE (15), PERMITTING SLIDE (15) TO RESTORE THRU SPRING (31). SPRING (30) PLATE 2, LOWERS STEP (R) OF LATCH (19) INTO BLOCKING POSITION OF ROLL (S) TO HOLD MULTIPLY NON-PRINT BELLCRANK (22) IN A RESTORED POSITION FOR THE LAST STROKE.

ON THE LAST FORWARD STROKE AS ARM (F), PLATE 1, ON THE UNIVERSAL DRIVE SHAFT (7) MOVES DOWNWARD, CONTROL ARM (C) WILL DROP BEHIND ROLL (D), THRU SPRING (6). STUD (E) ON ARM (F) WILL CONTACT EXTENSION (H) OF MOTOR DRIVE CONTROL ARM (3), RAISING ARM (3) OVERLATCHING IT WITH LATCH (5). ON THE RETURN STROKE ROLL (D) WILL DRIVE CONTROL ARM (C) TO THE REAR MOVING KEYSTEM LOCK RELEASE ARM (8) FORWARD. THIS WILL MOVE KEYSTEM LOCK BAIL (16) FORWARD UNLATCHING MULTIPLY KEY. MULTIPLY KEY WILL NOW RESTORE UNDER ITS OWN SPRING TENSION. MOTOR DRIVE CONTROL ARM (3) WILL LATCH WITH MOTOR DRIVE CONTROL ARM LATCH (5) STOPPING THE MOTOR. THE MACHINE WILL ALSO PRINT AND BACKSPACE ON THIS STROKE.

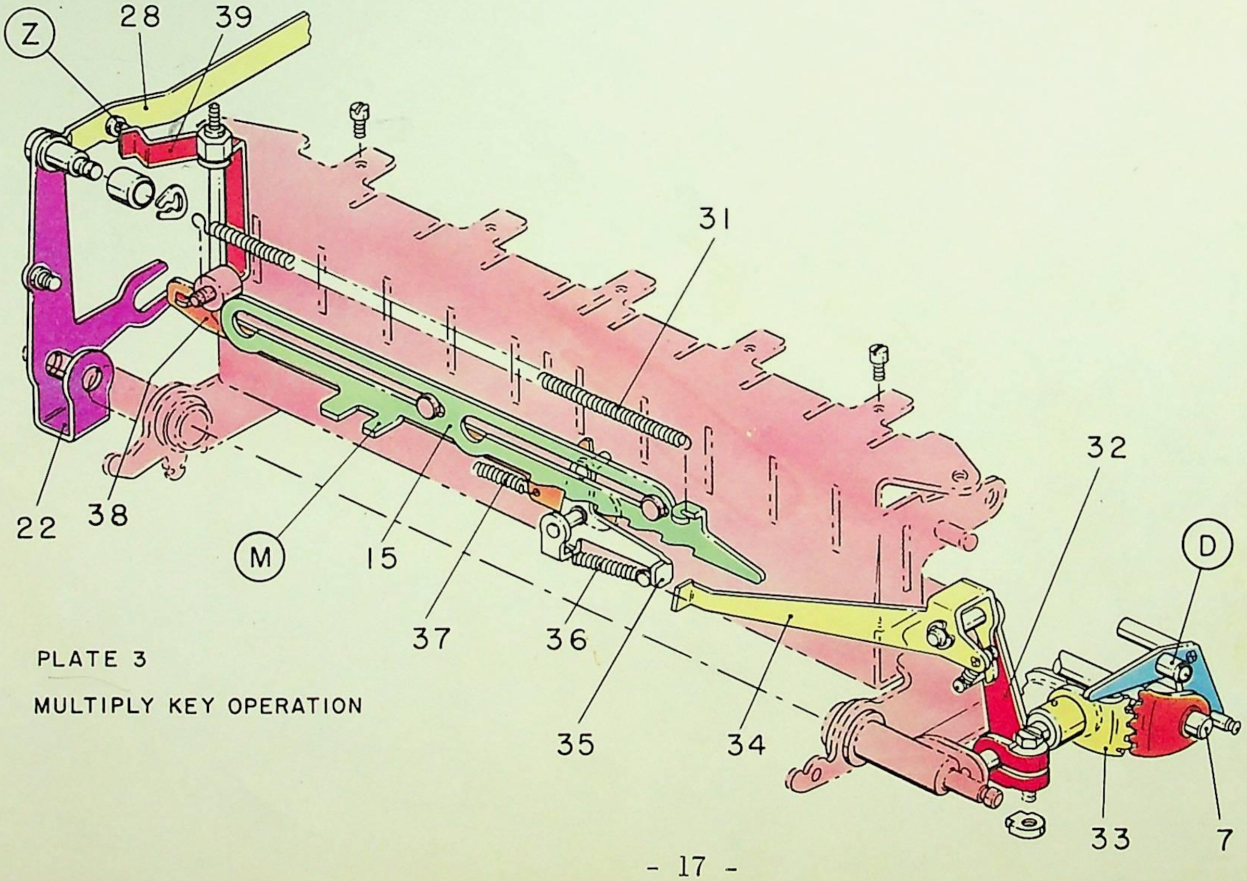

PLATE 3

MULTIPLY KEY OPERATION

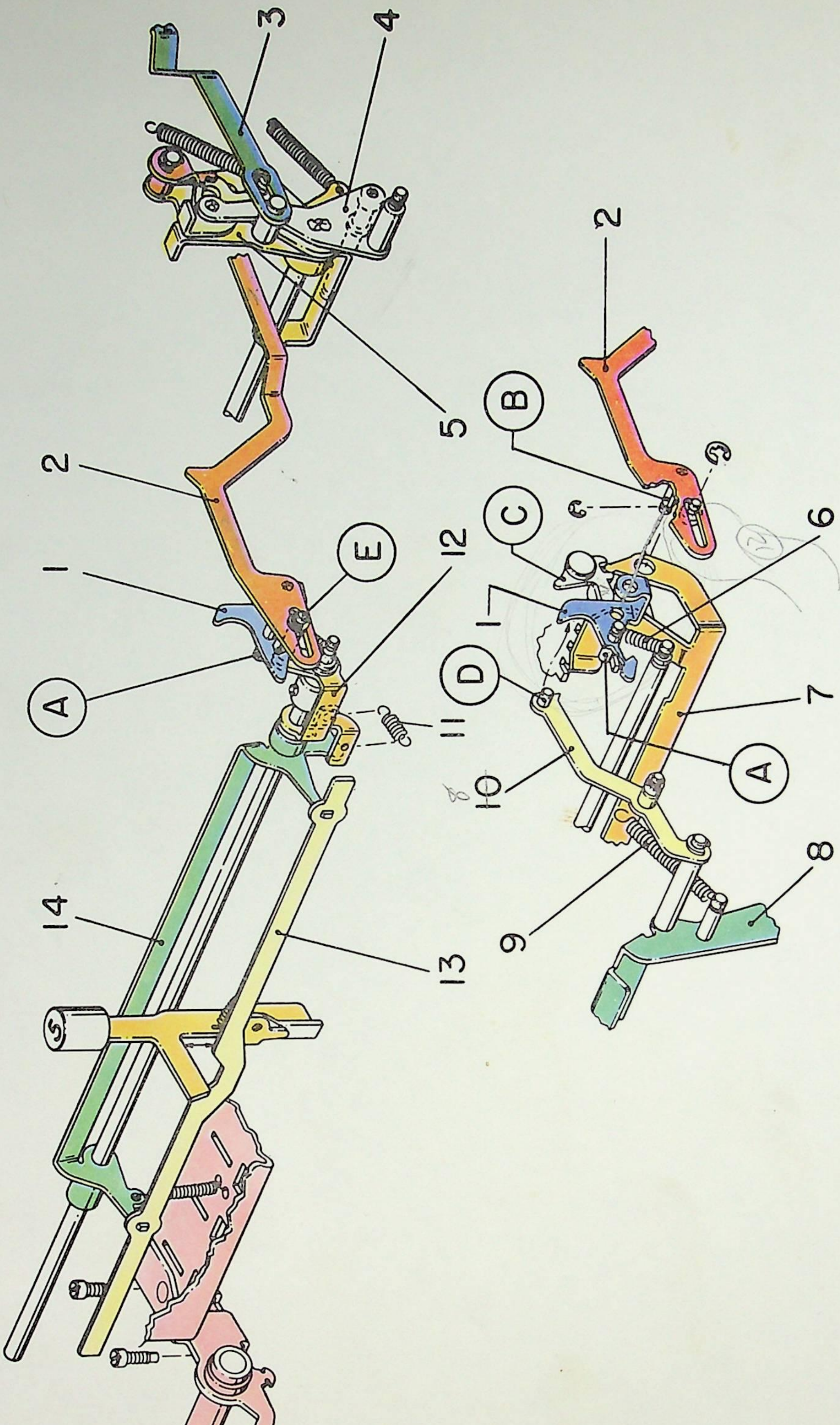

PLATE 4 KEY RESTORING MECHANISM

KEY RESTORING MECHANISM

PLATE 4

PLATE 4 SHOWS THE KEY RETURN MECHANISM. THIS MECHANISM IS NECESSARY TO HELP RESTORE A MULTIPLY KEY IN CASE PRESSURE IS APPLIED TO ANOTHER MULTIPLY KEY WHEN A MULTIPLY KEY IS RESTORING.

WHEN THE STOP SECTION IS NORMAL, THE BLANK STROKE LOCK BELLCRANK (7) CONTROLLING ARM (C) RESTING UNDER STUD (A) HOLDS THE KEYSTEM RETURN BAIL OPERATING PAWL (1) ABOVE STUD (E) OF THE KEYSTEM RETURN BAIL ARM (12). THIS WILL PREVENT SLIDE (13) FROM OPERATING ON LISTING OPERATIONS. (EXCEPT ON REPEAT LISTING OPERATIONS.)

WHEN AN ITEM IS ENTERED IN THE STOP SECTION, THE BLANK STROKE LOCK BELLCRANK (7) WILL MOVE TO THE REAR. THIS WILL PERMIT ARM (C) TO LOWER PAWL (1) LATCHING IT OVER STUD (E) OF THE KEYSTEM RETURN BAIL ARM (12).

AS A MULTIPLY KEY IS DEPRESSED AND LINK (10) MOVES TO THE REAR, STUD (D) WILL CONTACT THE KEYSTEM RETURN BAIL OPERATING PAWL (1), RAISING ITS FRONT EXTENSION OFF STUD (E) TO PREVENT OPERATING THE KEY RETURN SLIDE (13) UNTIL THE LAST STROKE OF EACH MULTIPLIER. ON THE LAST STROKE, AS LINK (10) RESTORES, STUD (D) WILL PERMIT THE FRONT PORTION OF PAWL (1) TO LATCH STUD (E). AS THE HIGH POINT OF THE MOTOR DRIVE CRANK PULLS THE FEATURE KEY RELEASE LINK (3) TO THE REAR, IT WILL ALSO, THROUGH THE FEATURE KEY LATCH ASSEMBLY (5), MOVE KEY RETURN BAIL OPERATING LINK (2) TO THE REAR AND, WITH IT, THE KEY RETURN BAIL OPERATING PAWL (1), MOUNTED ON STUD (B). THIS OPERATES THE KEYSTEM RETURN BAIL ARM (12) AND, THROUGH YIELD SPRING (11), ROTATES THE KEYSTEM RETURN BAIL (14) WHICH RAISES SLIDE (13).

THE PURPOSE OF YIELD SPRING (11) IS TO PREVENT PARTS FROM BEING THROWN OUT OF ADJUSTMENT OR POSSIBLY BROKEN IN CASE TOO MUCH PRESSURE IS APPLIED TO ANOTHER MULTIPLY KEY OR A MULTIPLY KEY IS BLOCKED AND CANNOT RESTORE.

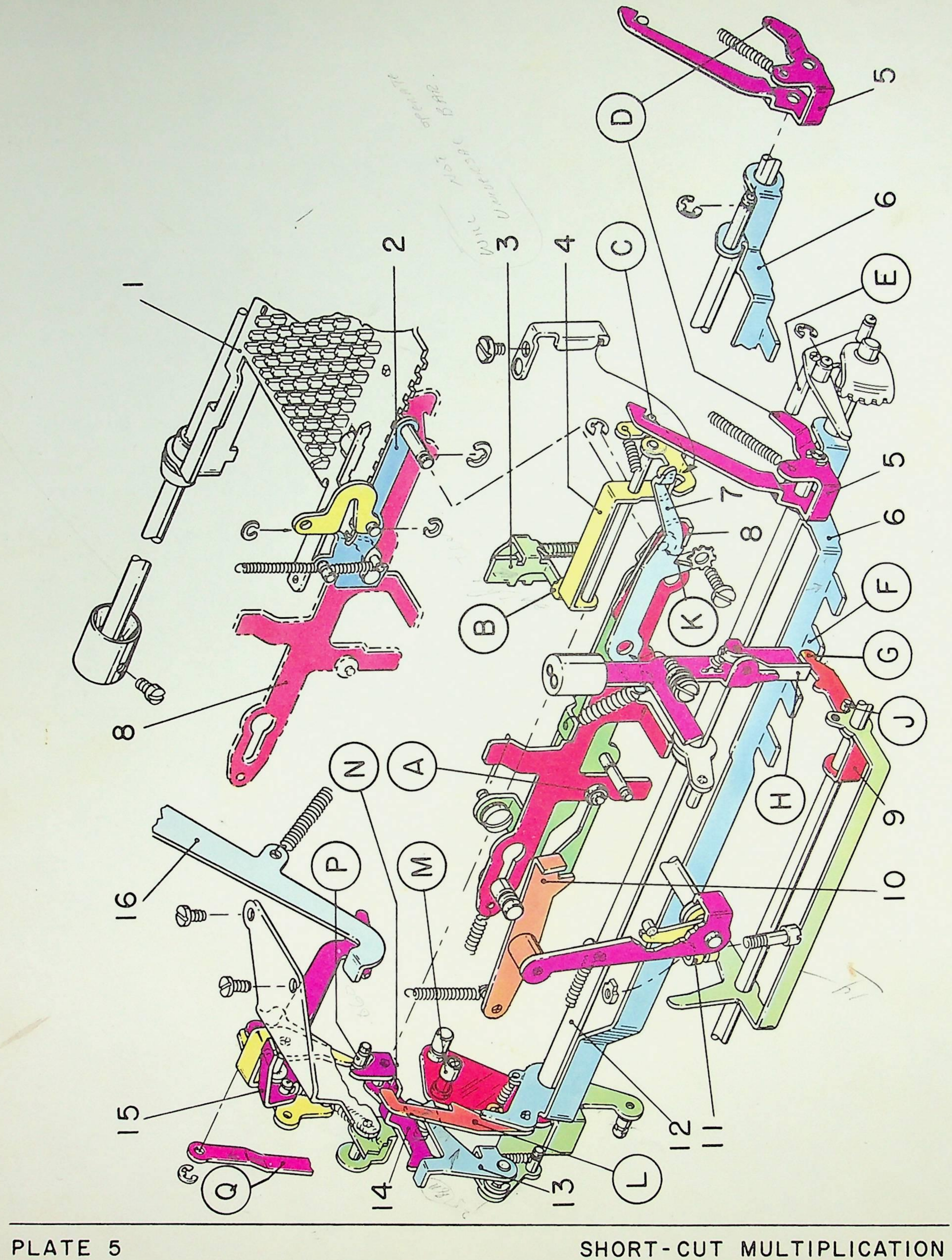

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PLATE 5 SHORT-CUT MULTIPLICATION

MODEL 99 PRINTING CALCULATOR

SHORT CUT MULTIPLICATION

MULTIPLY KEYS 6, 7, 8 AND 9

PLATES 5 AND 5A

THE NUMBER EIGHT MULTIPLY KEY WILL BE USED AS AN EXAMPLE AS SHOWN IN PLATE 5. AS THE MULTIPLY KEY IS DEPRESSED, YIELDING PAWL (H) RIVETED TO THE KEYSTEM WILL CONTACT EXTENSION (G) OF THE NEGATIVE KEYSTEM OPERATING BAIL ASSEMBLY (9). STUD (J) OF THE NEGATIVE KEYSTEM OPERATING BAIL ASSEMBLY (9) WILL POSITION THE KEYSTEM OPERATING BELLCRANK (14), KEYSTEM BELLCRANK COMB (13), MOTOR DRIVE BELLCRANK (12), MULTIPLY NON-PRINT BELLCRANK LATCH ACTUATOR (21) AND NON-PRINT BELLCRANK (22) THE SAME AS PREVIOUSLY DESCRIBED IN PLATES (1) AND (2).

AS EXTENSION (G) PLATE 5, MOVES DOWN, IT CONTACTS EXTENSION (F) ROTATING THE NEGATIVE MULTIPLY TYPE DRIVE BAIL (6). AS BAIL (6) ROTATES, SPACE KEY BAIL OPERATING PAWL (5) PULLS DOWNWARD ON STUD (C) OF SPACE KEY DRIVE BAIL (4), WHICH, IN TURN, DEPRESSES A SPACE STOP THROUGH SPACE KEY EXTENSION (3). THE FORWARD EXTENSION OF BAIL (4) RAISES CONTROL SLIDE LATCH (7) PERMITTING STOP SECTION CONTROL SLIDE (8) TO MOVE TO THE LEFT INTO STEP (K) OF THE CONTROL SLIDE LATCH (7). THIS PERMITS THE STOP SECTION (1) TO MOVE TO THE LEFT ONE SPACE.

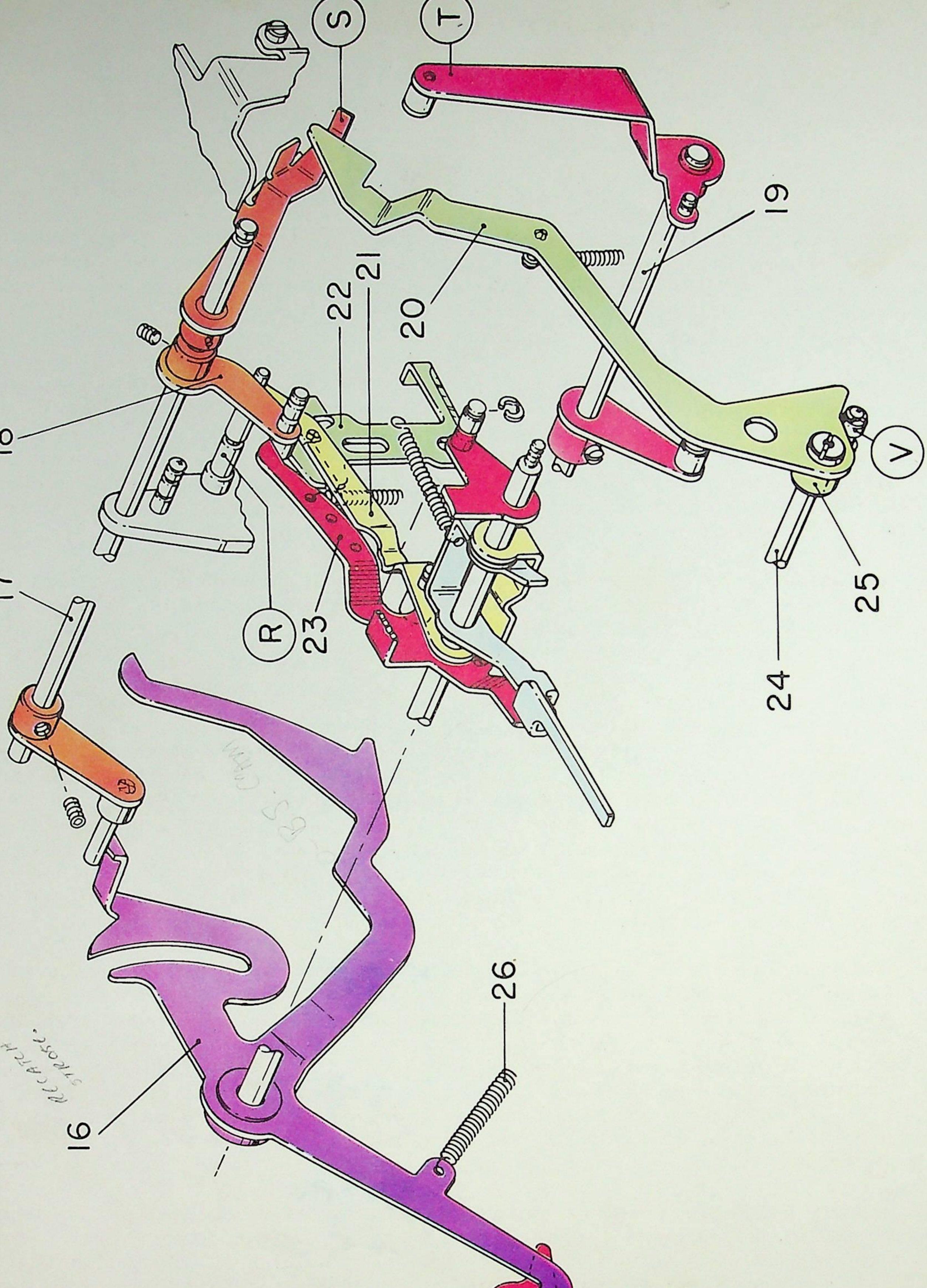
ALSO, AS THE NEGATIVE MULTIPLY TYPE DRIVE BAIL (6) MOVES DOWNWARD, IT CAUSES PAWL (L) TO PULL DOWN ON EXTENSION (N) OF THE NEGATIVE MULTIPLY RETAINING LATCH (14), RELEASING LATCH (14) FROM PAWL (13) PERMITTING PAWL (13) TO DROP SO THAT THE FORK IN ITS REARWARD EXTENSION LIES IN THE PATH OF STUD (M).

AS THE UNIVERSAL DRIVE SHAFT (12) IS OPERATED BY THE BACKSPACE CAM, STUD (M) WILL DRIVE PAWL (13) FORWARD AND MOVE THE NEGATIVE MULTIPLY LATCH RELEASE ARM LINK (Q) UPWARD, PUTTING SPRING TENSION ON THE NEGATIVE MULTIPLY OPERATING ARM LATCH (15). AT THE SAME TIME, STUD (M) WILL CONTACT PAWL (L) DRIVING IT FORWARD OFF LIP (N) AND PERMIT LATCH (14) TO RESTORE INTO BLOCKING POSITION OF PAWL (13). ON THE RIGHT SIDE OF THE MACHINE, STUD (E) CONTACTS EXTENSION (D) OF THE SPACE KEY BAIL OPERATING PAWL (5) MOVING THE PAWL FORWARD AND UPWARD UNLATCHING IT FROM STUD (C). THIS PERMITS SPACE KEY DRIVE BAIL (4) AND SPACE KEY EXTENSION (3) TO RESTORE. NEAR THE END OF THE FORWARD STROKE, A ROLL ON THE BACKSPACE CAM WILL CONTACT THE NEGATIVE MULTIPLY OPERATING ARM (16) UNLATCHING IT FROM ITS LATCH (15).

ON THE FIRST RETURN STROKE, SPRING (26) PLATE 5A, WILL ROTATE ARM (16) CAUSING ITS UPPER EXTENSION TO ROTATE SHAFT (17). ARM (18) ON SHAFT (17) WILL RAISE THE SUBTRACT ARM OPERATING BAIL (23) AND THE SUBTRACT YIELD ARM (21) POSITIONING THE VERTICAL SUBTRACT SLIDE (22) IN A RAISED POSITION. EXTENSION (S) ON THE RIGHT ARM OF SHAFT (17) WILL MOVE TO AN OVERLATCHED POSITION OF THE SUBTRACT LATCH ARM (20). THE MACHINE WILL THEN BACKSPACE. AS THE BACKSPACE PAWL (10) PLATE 5, MOVES TO THE RIGHT, IT CONTACTS ROLL (A) MOVING THE STOP SECTION CONTROL SLIDE (8) TO THE RIGHT, RELATCHING IT WITH THE CONTROL SLIDE LATCH (7); AT THE SAME TIME, MOVING THE STOP SECTION (1) ONE SPACE TO THE RIGHT.

ON THE SECOND FORWARD STROKE, THE NEGATIVE MULTIPLY OPERATING ARM (16) PLATE 5A, WILL BE RELATCHED WITH LATCH (15). AT THIS TIME, THE SUBTRACT LATCH ARM (20) WILL HOLD THE SUBTRACT MECHANISM IN A RAISED POSITION. THE ACCUMULATOR WHEELS WILL REVOLVE TO A SUBTRACT POSITION FOR THE REMAINDER OF THE MULTIPLYING DIGIT.

ON THE LAST STROKE OF THE MULTIPLIER, THE MACHINE WILL AGAIN BACKSPACE IF THERE IS A SPACE IN THE UNITS COLUMN. BACKSPACING AT THIS TIME WILL CAUSE ARM (T) ON THE RIGHT END OF THE BACKSPACE SHAFT (19) TO CONTACT LATCH (20) UNLATCHING IT FROM EXTENSION (S)



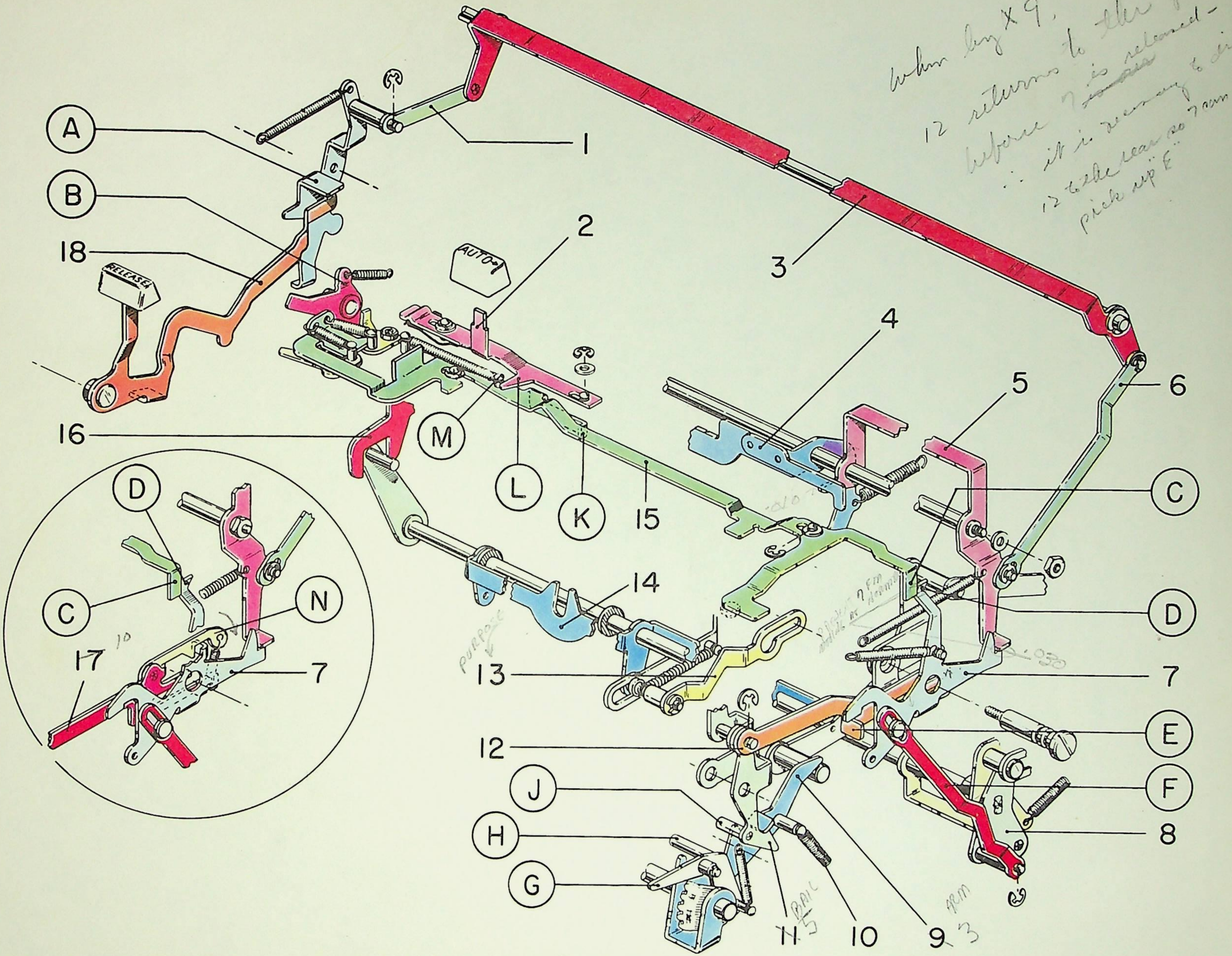
RECATCH ON 2ND FWD STROKE.

B.S. CAM

PLATE 5A SHORT-CUT MULTIPLICATION

AND PERMITTING SHAFT (17) TO RESTORE. THIS WILL PERMIT ARM (18) TO LOWER THE SUBTRACT ARM OPERATING BAIL (23), SUBTRACT YIELD ARM (21) AND THE VERTICAL MEMBER (22) OF THE SUBTRACT SLIDE.

IF THE RELEASE KEY IS USED OR IF THERE IS A SIGNIFICANT FIGURE IN THE UNITS COLUMN, ON THE LAST STROKE OF THE MULTIPLIER, THE STOP SECTION WILL RESTORE. ROLL (V) ON ARM (25) ON THE RIGHT END OF RESET GEAR SHAFT (24) WILL CONTACT LATCH (20), UNLATCHING IT FROM EXTENSION (S) AND PERMIT SHAFT (17) AND THE SUBTRACT MECHANISM TO RESTORE.



when key X 9;
12 returns to the front
before 7 is released -
~~[illegible]~~
∴ it is necessary to dim
12 take rear so 7 arm
pick up E

PLATE 6

AUTOMATIC TOTAL MECHANISM

AUTOMATIC TOTAL MECHANISM

PLATE 6

AS FIRST MULTIPLY KEY IS DEPRESSED, KEYBOARD INTERLOCK SLIDE (15) MOVES TO THE RIGHT POSITIONING EXTENSION (C) OUT OF THE PATH OF EXTENSION (D). AS THE UNITS ADDING RACK MOVES OUT OF SPACE POSITION, THE DIVISION CONTROL LEVER OPERATING ARM (4) ROTATES THE AUTOMATIC TOTAL MULTIPLY LATCH RETAINING BAIL (5) RELEASING THE AUTOMATIC TOTAL MULTIPLY LATCH (7) SO THAT ITS FORWARD EXTENSION WILL MOVE DOWN AND REST ON LIP (E). STUD (H) IN ARM (G) CONTACTS THE UPRIGHT PORTION OF ARM (9) RAISING ARM (9), CAUSING THE CAMMING SURFACE OF THIS ARM TO CONTACT STUD (J) OF LATCH (11). THIS CAUSES LINK (12) TO BE DRIVEN REARWARD,LATCHING LIP (E) WITH LATCH (7) TO KEEP THE MOTOR RUNNING FOR THE REST OF THE OPERATION.

THE MOTOR WILL CONTINUE TO OPERATE UNTIL THE TOTAL STROKE. AS THE TOTAL SLIDE (16) MOVES REARWARD, IT WILL ROTATE THE FEATURE KEY LATCH SHAFT (8) AND, THROUGH CONNECTING LINK (F), MULTIPLY LATCH (7) WILL BE MOVED UPWARD, UNLATCHING LIP (E) AND, AT THE SAME TIME, RELATCHING WITH BAIL (5). THE MOTOR DRIVE CONTROL ARM LATCH (11) RELATCHES THE MULTIPLY MOTOR DRIVE CONTROL ARM (9), STOPPING THE MACHINE AT THE END OF STROKE.

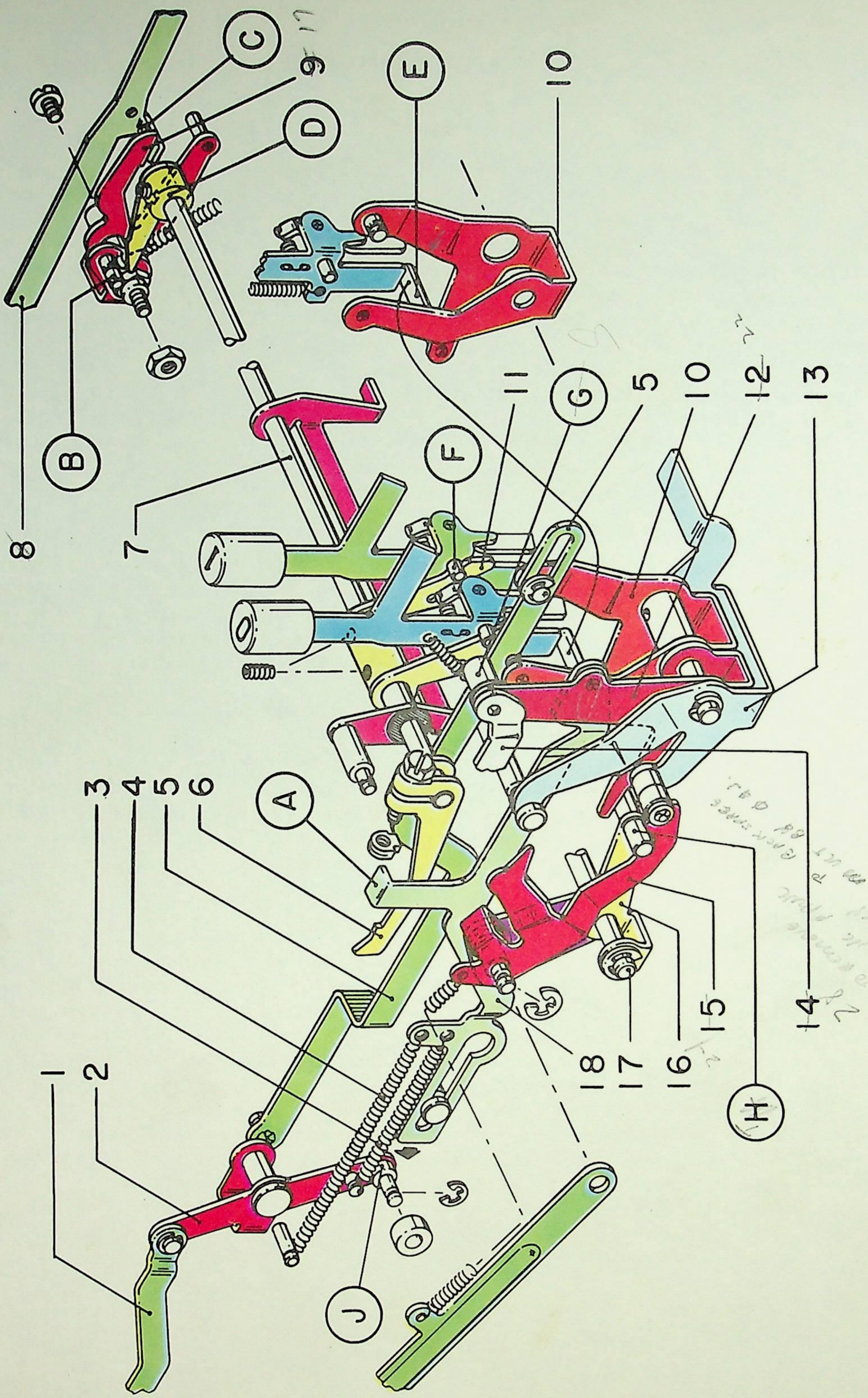
>

IF THE RELEASE KEY IS OPERATED DURING A PROBLEM, RELEASE KEYLEVER EXTENSION (18) WILL CONTACT ARM (A), LATCHING IT IN FRONT OF LATCH (B). THIS WILL ACTUATE LINK (1) AND, THROUGH BAIL (3) AND LINK (6), WILL RELEASE AUTOMATIC TOTAL MULTIPLY LATCH RETAINING BAIL (5) FROM AUTOMATIC TOTAL MULTIPLY LATCH (7). THE MACHINE WILL THEN TAKE AN AUTOMATIC BLANK STROKE AND TOTAL THE SAME AS PREVIOUSLY DESCRIBED.

WHEN ACCUMULATIVE MULTIPLICATION IS DESIRED, AUTOMATIC TOTAL MULTIPLY LOCK SLIDE (2) IS POSITIONED TO THE LEFT. THIS WILL POSITION EXTENSION (L) IN THE PATH OF STUD (M) AND HOLD EXTENSION (C) IN THE PATH OF EXTENSION (D) PREVENTING LATCH (7) FROM LATCHING LIP (E); THEREFORE, PREVENTING THE MACHINE FROM TOTALING. ALSO, AS EXTENSION (L) MOVES INTO THE PATH OF STUD (M), EXTENSION (K) WILL BE PREVENTED FROM MOVING OVER THE UNIVERSAL BAR. THIS IS NECESSARY TO PERMIT A NEW PROBLEM TO BE SET UP IN THE MACHINE EVEN THOUGH AN AUTOMATIC TOTAL HAS NOT BEEN TAKEN.

THE PURPOSE OF DISENGAGING PAWL (N) (INSET) ON THE CONTROL CONNECTOR LINK (17) IS TO NORMALIZE THE AUTOMATIC TOTAL MULTIPLY LATCH (7) IF FOR ANY REASON AN OPERATOR USED THE RELEASE KEY BEFORE ENTERING THE MULTIPLICAND IN THE KEYBOARD. IF THE RELEASE KEY WAS USED IN THIS MANNER AND THE AUTOMATIC TOTAL MULTIPLY LATCH (7) WAS NOT NORMALIZED, THE MACHINE WOULD TAKE AN AUTOMATIC BLANK STROKE AND TOTAL AFTER THE FIRST MULTIPLIER. IF THE RELEASE KEY IS USED AFTER THE MULTIPLICAND HAS BEEN ENTERED IN THE KEYBOARD, THE MACHINE WILL CLEAR IN THE USUAL MANNER. THIS IS DUE TO ARM (A) BEING LATCHED IN FRONT OF LATCH (B).

THE PURPOSE OF LINK (13) CONNECTED TO DECIMAL OPERATING BAIL (14) IS TO RAISE PLUNGER WHEN DECIMAL KEY IS DEPRESSED. THIS WILL PREVENT STOP SECTION FROM CLEARING OUT WHEN DISCOUNT MULTIPLICATION IS PERFORMED.


A
B
C
D
E
F
G
H
J
To remove
cable pawl
necessary
back space

MODEL 99 PRINTING CALCULATOR

NON-PRINT MECHANISM

(INCLUDING OPERATION OF #0 & #1 KEYS)

PLATE 7

WHEN USING MULTIPLY KEYS 1 THRU 5, WHICH DO NOT REQUIRE SHORT-CUT OPERATIONS, THE MODEL 99 CYCLES THE SAME NUMBER OF STROKES AS THE VALUE OF THE MULTIPLIER. FOR EXAMPLE - WHEN MULTIPLYING BY FIGURE 1, THE MACHINE WILL TAKE ONLY 1 STROKE, MULTIPLYING BY FIGURE 3 REQUIRES ONLY 3 STROKES, ETC.

AS PREVIOUSLY EXPLAINED ON PLATE 1, MULTIPLY KEYS 2 THRU 9, THE OPERATION OF KEYSTEM BELLCRANK (14) WILL POSITION EXTENSION (L) IN PATH OF KEYSTEM BELLCRANK OPERATING SLIDE (15) AND ROTATE DOWNWARD THE KEYSTEM BELLCRANK COMB (13) ACTUATING THE MULTIPLY NON-PRINT BELLCRANK LATCH ACTUATOR (13) PLATE 7, RELEASING NON-PRINT BELLCRANK (12). AS BELLCRANK (12) MOVES TO THE REAR, SPRING (4) PULLS MULTIPLY NON-PRINT SLIDE (18) REARWARD. REAR PORTION OF SLIDE (18) WILL CONTACT INNER ROLL (J) ON NON-PRINT BELLCRANK (2), POSITIONING NON-PRINT LINKAGE (1)TOWARD FRONT OF MACHINE.

ON NEXT TO LAST FORWARD STROKE, EXTENSION (M) PLATE 1, OF THE KEYSTEM BELLCRANK OPERATING SLIDE (15) CONTACTS EXTENSION (L) OF KEYSTEM BELLCRANK (14), RELEASING EXTENSION (Q) FROM THE KEYSTEM PERMITTING IT AND BELLCRANK COMB (13) TO RESTORE. THIS ALLOWS THE MULTIPLY NON-PRINT BELLCRANK LATCH ACTUATOR (13) PLATE 7, TO RESTORE, ALLOWING MULTIPLY NON-PRINT BELLCRANK RESTORING ARM PAWL (15) TO LATCH WITH ROLL (H) ON MULTIPLY NON-PRINT RESTORING ARM (16). ON NEXT TO THE LAST RETURN STROKE, PAWL (15) RESTORES NON-PRINT BELLCRANK RESTORING ARM (16), RESTORING NON-PRINT BELLCRANK (12) AND NON-PRINT SLIDE (18). AS NON-PRINT SLIDE (18) RESTORES, SPRING (3) WILL RESTORE NON-PRINT LINKAGE (1). THIS WILL SET UP MACHINE FOR A PRINT AND BACKSPACE OPERATION ON THE LAST STROKE.

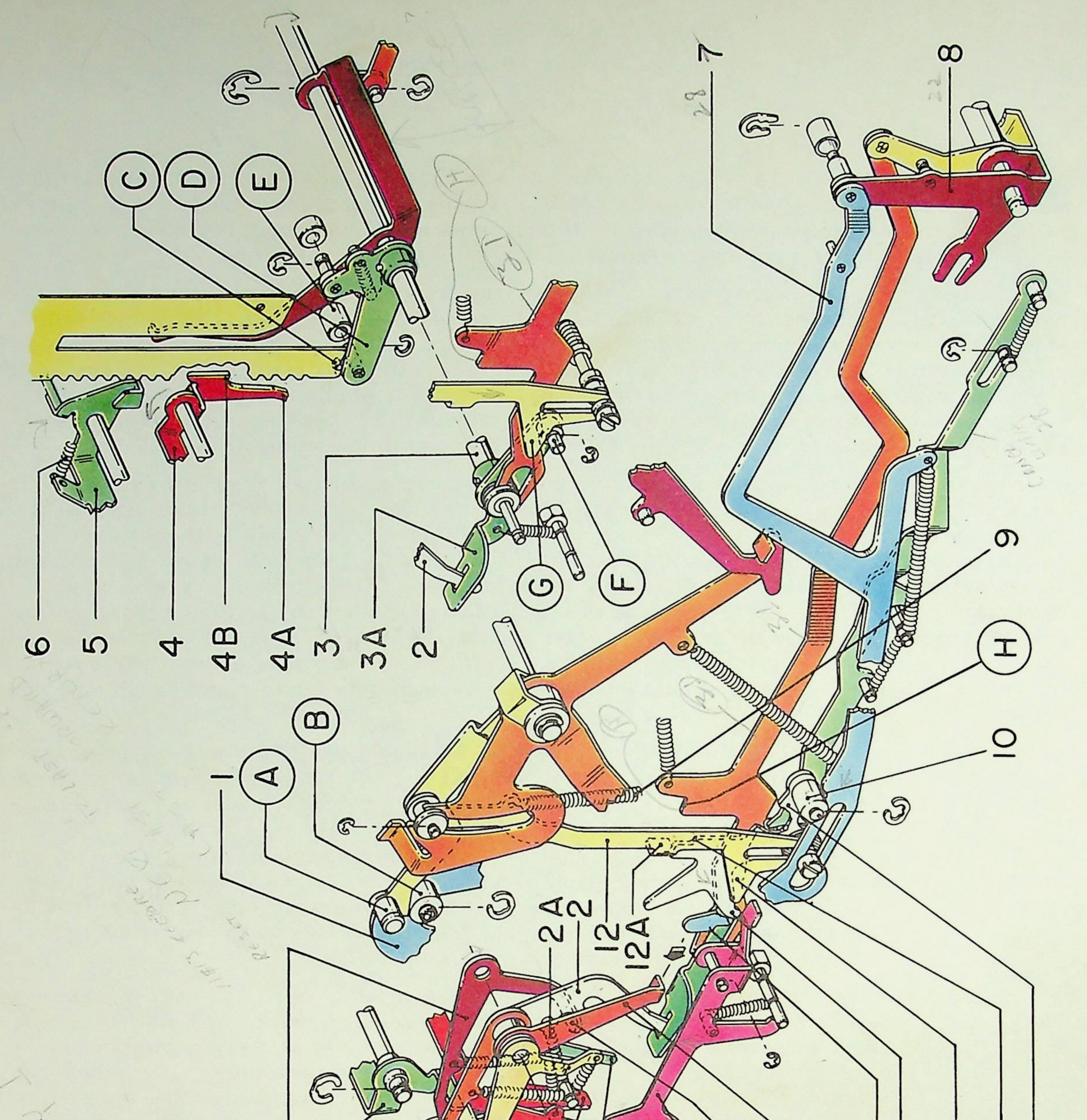
WHEN EITHER THE 0 OR 1 MULTIPLY KEY IS DEPRESSED, STUD (F) (WHICH IS ONLY IN KEYSTEMS 0 AND 1) ON THE KEYSTEMS WILL CONTACT THE ZERO KEY RETAINING MECHANISM DRIVE ARM (11) ROTATING MOTOR DRIVE BELLCRANK LATCH RETAINING SHAFT (7) TO ACCOMPLISH THE FOLLOWING:

1. ARM (D) AT RIGHT END OF SHAFT (7), MOVES UPWARD TO BLOCK STUD (B), PREVENTING THE MULTIPLY MOTOR DRIVE BELLCRANK LATCH (9) FROM LATCHING LIP (C) OF THE CONTROL CONNECTOR LINK (8). THIS WILL PERMIT THE MOTOR DRIVE CONTROL ARM (3) PLATE 1, TO RELATCH ON THE FIRST STROKE, PREVENTING MACHINE FROM TAKING MORE THAN ONE OPERATION.
2. MULTIPLY NON-PRINT BELLCRANK SLIDE RETAINING ARM (6) PLATE 7, ON LEFT END OF SHAFT (7) IS RAISED TO BLOCK EXTENSION (A) OF THE MULTIPLY NON-PRINT BELLCRANK SLIDE (18) PREVENTING SLIDE (18) FROM ACTUATING THE NON-PRINT BELLCRANK (2) AND NON-PRINT BLOCK ARM ASSEMBLY (1). THEREFORE, MACHINE WILL PRINT ON THIS STROKE. MULTIPLY MECHANISM OPERATING SLIDE (14) BEING POSITIONED TO THE REAR WILL HOLD THE BACKSPACE CONTROL PAWL LONG, TO THE REAR, PERMITTING THE BACKSPACE MECHANISM TO BE OPERATIVE ON THIS STROKE.

#0 MULTIPLY KEY

DUE TO THE FACT THAT NO VALUES ARE CHANGED IN A MULTIPLICATION PROBLEM WHEN MULTIPLYING BY A ZERO, IT IS NECESSARY FOR THE NON-ADD MECHANISM TO BE OPERATED WHENEVER THE #0 MULTIPLY KEY IS USED. THIS IS ACCOMPLISHED IN THE FOLLOWING MANNER:

> LOCATED DIRECTLY BENEATH THE #0 MULTIPLY KEYSTEM IS A STUD (E) ON THE MULTIPLY NON-ADD BELLCRANK (10). DEPRESSION OF THE #0 MULTIPLY KEY WILL, THEREFORE, CAUSE THE MULTIPLY NON-ADD BELLCRANK (10) TO BE ACTUATED AND THROUGH MULTIPLY NON-ADD BELLCRANK LINK (5) WILL POSITION THE NON-ADD MECHANISM FOR A NON-ADD OPERATION.



EAT Lunch wrappers - xrays with sheet as 16 cents.

PLATE 8

M and Q RACK

MULTIPLIER AND QUOTIENT RACK

PLATES 8, 8A AND 8B

THE TYPE ON THE RIGHT SIDE OF THE M & Q RACK ARE USED FOR MULTIPLICATION. THESE TYPE ARE ARRANGED FROM TOP TO BOTTOM IN THE FOLLOWING ORDER:

0 - 1 2 3 4 5 9 8 7 6

THE M & Q RACK NORMALLY RESTS IN THE DECIMAL PRINTING POSITION. THERE ARE THREE INITIAL POSITIONS OF THE M & Q RACK TO OBTAIN PROPER PRINTING POSITION AS ALL MULTIPLY KEYS DO NOT SET UP THE SAME CONDITION IN THE MACHINE. THE CONDITIONS ARE AS FOLLOWS:

A. MULTIPLY KEYS 1 THRU 5:

THERE ARE NO EXTRA STROKES OF THE MACHINE WHEN USING MULTIPLY KEYS 1 THRU 5 AND, SINCE PRINTING TAKES PLACE BEFORE THE M & Q RACK FEEDS, IT IS NECESSARY TO POSITION THE M & Q RACK UP ONE SPACE TO OBTAIN CORRECT PRINTING.

WHEN A MULTIPLY KEY IS DEPRESSED AND THE MULTIPLY NON-PRINT BELLCRANK (8) PLATE 8, ROTATES, THE MULTIPLY MECHANISM OPERATING SLIDE (7) MOVES REARWARD, ROTATING THE MULTIPLY CAM LINK LIMIT ARM (11) POSITIONING STEP (11A) INTO THE PATH OF EXTENSION (12A). EXTENSION (J) OF SLIDE (7) WILL CONTACT RETAINING ARM (13), UNLATCHING LIMIT LATCH (4). ROLL (L) OF LIMIT LATCH (4) WILL LIMIT AGAINST STEP (14A) OF ARM (14), POSITIONING (4A) IN THE PATH OF EXTENSION (C) OF THE M & Q RACK. THIS WILL PREVENT THE M & Q RACK OVERTHROWING ITS INITIAL ONE SPACE MOVEMENT.

AS THE MAINSHAFT MOVES FORWARD, THE NEGATIVE MULTIPLY TYPE DRIVE CAM LINK (12) WILL MOVE DOWN THROUGH THE TENSION OF SPRING (9) UNTIL (12A) LIMITS ON (11A). EXTENSION (G) OF LINK (12) WILL CONTACT STUD (F) OF THE NEGATIVE MULTIPLY TYPE DRIVE SHAFT ARM (3A), ROTATING SHAFT (3) AND CAUSING ARM (D), PINNED TO SHAFT (3), TO POSITION THE M & Q RACK UP ONE SPACE. THE MULTIPLY REPEAT ARM (20) PLATE 8A, ON THE RIGHT END OF SHAFT (3) WILL ROTATE THE REPEAT SHAFT ARM (21), RAISING THE PLUNGER (22) TO PREVENT THE STOP SECTION FROM CLEARING.

NEAR THE END OF THE FORWARD STROKE, BACKSPACE CAM (1) PLATE 8, WILL CONTACT EXTENSION (K) OF THE TYPE CARRIER RETAINING PAWL LOCK HOOK (16) UNLATCHING THE TYPE CARRIER RETAINING PAWL (5). RETAINING PAWL (5) WILL MOVE INTO THE TEETH OF THE M & Q RACK UNDER THE TENSION OF SPRING (6). AT THE SAME TIME, EXTENSION (M) WILL CONTACT EXTENSION (N) OF LIMIT LATCH (4), MOVING (4A) OUT OF THE PATH OF EXTENSION (C) OF THE M & Q RACK AND OUTER EXTENSION (P) OF LIMIT LATCH (4) OVERLATCHES LATCH (15). THIS SEQUENCE OF OPERATION IS VERY IMPORTANT BECAUSE FAILURE TO MOVE LIMIT LATCH (4) OUT OF BLOCKING POSITION BEFORE THE M & Q RACK FEEDS WOULD PREVENT THE M & Q RACK FROM FEEDING.

AT THE SAME TIME THE BACKSPACE CAM CONTACTED EXTENSION (K) OF LOCK HOOK (16), IT PERMITTED THE NEGATIVE MULTIPLY TYPE DRIVE ARM LATCH (2) TO MOVE TO THE REAR UNDER TENSION OF SPRING (2A). THE LOWER EXTENSION OF (2) MOVED INTO A LATCHING POSITION OF ARM (3A), HOLDING THE MULTIPLY REPEAT ARM (20) PLATE 8A, AGAINST REPEAT SHAFT ARM (21), KEEPING THE PLUNGER (22) IN A RAISED POSITION TO PREVENT THE STOP SECTION FROM CLEARING.

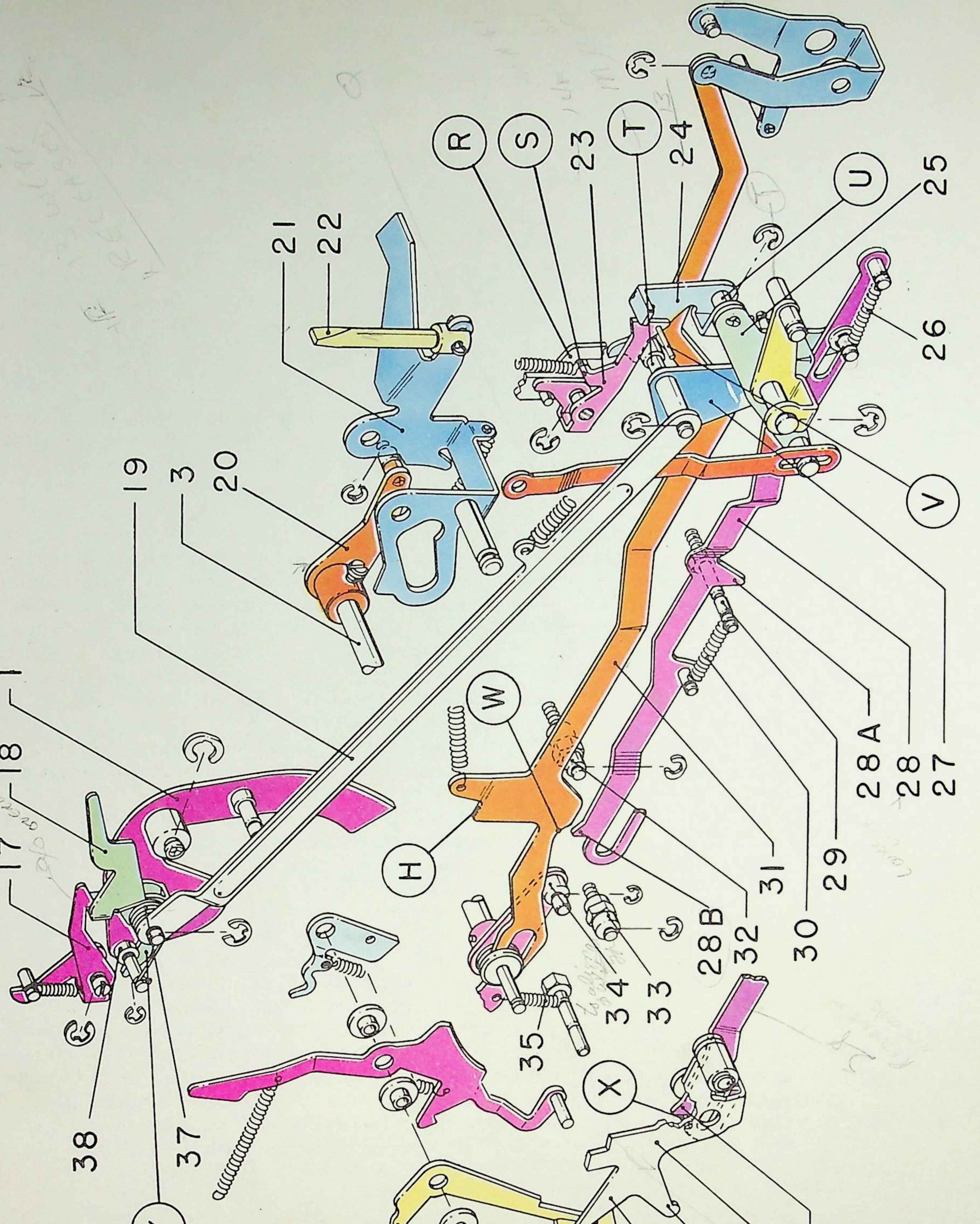


PLATE 8A

M and Q RACK

THE MACHINE WILL CONTINUE TO OPERATE AND ON NEXT TO THE LAST FORWARD STROKE, EXTENSION (M) PLATE 1, WILL CONTACT EXTENSION (L) OF THE KEYSTEM OPERATING BELLCRANK (14), RELEASING KEYSTEM BELLCRANK COMB (13). THIS WILL PERMIT NON-PRINT BELLCRANK LATCH ACTUATOR (21) PLATE 2, TO RESTORE, ALLOWING NON-PRINT BELLCRANK RESTORING ARM PAWL (24) TO LATCH WITH ROLL (T) ON NON-PRINT BELLCRANK RESTORING ARM (23).

ON NEXT TO THE LAST RETURN STROKE, RESTORING ARM PAWL (24) WILL RESTORE NON-PRINT BELLCRANK RESTORING ARM (23), NON-PRINT BELLCRANK (8) PLATE 8, AND MULTIPLY MECHANISM OPERATING SLIDE (7). AS SLIDE (7) IS MOVED FORWARD, LIMIT ARM (11) RESTORES AND RETAINING ARM (13) RESTORES TO A LATCHING POSITION OF LIMIT LATCH (4). ARM (13) ALSO CONTACTS EXTENSION (15A) LOWERING LATCH (15).

ON THE LAST STROKE, AS THE MACHINE PRINTS, THE TYPE CARRIER RETAINING PAWL RELEASE HOOK WILL PICK UP RETAINING PAWL (5) AND RELATCH IT WITH LOCK HOOK (16). THIS WILL CAUSE EXTENSION (K) OF LOCK HOOK (16) TO UNLATCH LATCH (2) FROM (3A) AND PERMIT SHAFT (3) AND PLUNGER (22) TO RESTORE. OUTER EXTENSION (P) OF LIMIT LATCH (4) WILL BECOME LATCHED WITH RETAINING ARM (13).

B. MULTIPLY KEYS 6 THRU 9

THE MACHINE OPERATES BY THE SHORT-CUT METHOD WHEN MULTIPLIER DIGITS 6 THRU 9 ARE USED. FOR EXAMPLE; WHEN MULTIPLYING BY 9, THE MACHINE WILL TAKE TWO STROKES. TO OBTAIN PROPER PRINTING POSITION, THE M & Q RACK IS INITIALLY POSITIONED UP FIVE SPACES, FROM THERE IT WILL BE FED UP ONE SPACE ON EACH OPERATION.

WHEN A MULTIPLY KEY 6 THRU 9 IS DEPRESSED, BELLCRANK (8), SLIDE (7), LIMIT ARM (11), RETAINING ARM (13) AND LIMIT LATCH (4) WILL BE POSITIONED THE SAME AS IN THE MULTIPLY KEYS 1 THRU 5 OPERATION. NEGATIVE MULTIPLY MOTOR DRIVE ENGAGING PAWL (R) PLATE 8A, WILL CONTACT LIP (S) OF THE NEGATIVE MULTIPLY MOTOR DRIVE RETAINING LATCH (23), RELEASING LATCH (23) FROM PAWL (24), PERMITTING THE REAR EXTENSION OF (24) TO DROP IN FRONT OF STUD (T). AS THE MAINSHAFT MOVES FORWARD, BACKSPACE CAM (1) WILL DRIVE UNIVERSAL DRIVE LINK (19) FORWARD, CAUSING STUD (T) TO MOVE PAWL (24) FORWARD, ROTATING THE NEGATIVE MULTIPLY MOTOR DRIVE ARM (25), CAUSING ITS LOWER EXTENSION TO MOVE REARWARD. THROUGH YIELD SPRING (26), THE NEGATIVE MULTIPLY MOTOR DRIVE SLIDE (28) WILL MOVE REARWARD, CAUSING ITS REARWARD EXTENSION (28B) TO CONTACT STUD (X) OF THE MULTIPLY CAM LINK LIMIT ARM (11), MOVING LIMIT ARM (11) TO THE REAR SO THAT STEP (11A) PLATE 8, WILL BE OUT OF THE PATH OF EXTENSION (12A) OF LINK (12). EXTENSION (11C) PLATE 8A, WILL HOLD THE OUTER PAWL (36) TO THE REAR TO PERMIT BACKSPACING ON THE FIRST RETURN STROKE. EXTENSION (11B) PLATE 8, WILL CONTACT THE FORWARD EXTENSION OF THE TYPE CARRIER LIMIT LATCH CONTROL ARM (14), POSITIONING ROLL (L) FROM THE (14A) TO THE (14B) POSITION. THIS WILL MOVE (4A) OUT OF THE PATH OF (C) AND PLACE (4B) INTO THE PATH OF (C) TO PREVENT THE M & Q RACK OVERTHROWING ITS INITIAL FIVE SPACE MOVEMENT.

THE NEGATIVE MULTIPLY TYPE DRIVE CAM LINK (12) WILL MOVE DOWN, THROUGH SPRING (9), EXTENSION (G) WILL CONTACT STUD (F), ROTATING SHAFT (3) AND CAUSE ARM (D) TO RAISE THE M & Q RACK FIVE SPACES. THE MULTIPLY REPEAT ARM (20) PLATE 8A, ON THE RIGHT END OF SHAFT (3) WILL CONTACT THE REPEAT SHAFT ARM (21) AND RAISE THE PLUNGER (22). NEAR THE END OF THE

FORWARD STROKE, THE BACKSPACE CAM (1) WILL CONTACT EXTENSION (K) OF LOCK HOOK (16) PLATE 8, RELEASING RETAINING PAWL (5). EXTENSION (M) OF (5) WILL CONTACT EXTENSION (N) OF (4) AND MOVE (4B) OUT OF THE PATH OF (C). AT THE SAME TIME, EXTENSION (K) WILL PERMIT LATCH (2) TO MOVE INTO A LATCHING POSITION WITH (3A). OUTER EXTENSION (P) OF LIMIT LATCH (4) WILL OVERLATCH WITH LATCH (15).

STUD (T) OF THE UNIVERSAL DRIVE SHAFT ARM (27) PLATE 8A, WILL CONTACT THE NEGATIVE MULTIPLY MOTOR DRIVE ENGAGING PAWL (R), DRIVING IT FORWARD OFF LIP (S) OF RETAINING LATCH (23). RETAINING LATCH (23) WILL RESTORE TO A BLOCKING POSITION OF THE NEGATIVE MULTIPLY MECHANISM MOTOR DRIVE PAWL (24).

ON THE FIRST RETURN STROKE, THE NEGATIVE MULTIPLY MOTOR DRIVE SLIDE (28) WILL RESTORE THROUGH THE TENSION OF SPRING (30). THIS WILL PERMIT LIMIT ARM (11) TO RESTORE TO THE ONE SPACE POSITION. THE OUTER PAWL (36) WILL MOVE INTO A LATCHING POSITION TO RECEIVE THE BACKSPACER AND CONTROL ARM (14) PLATE 8, WILL RESTORE.

ON NEXT TO THE LAST FORWARD STROKE EXTENSION (M) PLATE 1, OF THE KEY-STEM BELLCRANK OPERATING SLIDE (15) WILL CONTACT EXTENSION (L) OF THE KEYSTEM OPERATING BELLCRANK (14) RELEASING KEYSTEM BELLCRANK COMB (13). THIS WILL PERMIT NON-PRINT BELLCRANK LATCH ACTUATOR (21) PLATE 2, TO RESTORE, ALLOWING NON-PRINT BELLCRANK RESTORING ARM PAWL (24) TO LATCH WITH ROLL (T) ON NON-PRINT BELLCRANK RESTORING ARM (23).

ON NEXT TO THE LAST RETURN STROKE, RESTORING ARM PAWL (24) WILL RESTORE NON-PRINT BELLCRANK RESTORING ARM (23), NON-PRINT BELLCRANK (8) PLATE 8, AND MULTIPLY MECHANISM OPERATING SLIDE (7). AS SLIDE (7) IS MOVED FORWARD, LIMIT ARM (11) RESTORES AND RETAINING ARM (13) RESTORES TO A LATCHING POSITION OF LIMIT LATCH (4).

ON THE LAST STROKE, AS THE MACHINE PRINTS, THE TYPE CARRIER RETAINING PAWL RELEASE HOOK WILL PICK UP THE RETAINING PAWL (5) AND RELATCH IT WITH LOCK HOOK (16). THIS WILL CAUSE EXTENSION (K) OF (16) TO UNLATCH (2) FROM (3A), PERMITTING SHAFT (3) TO RESTORE AND THE PLUNGER (22) TO RESTORE. OUTER EXTENSION (P) OF LIMIT LATCH (4) WILL BECOME LATCHED WITH RETAINING ARM (13).

C. MULTIPLYING BY "O"

TO GET THE ZERO IN PRINTING POSITION, IT IS NECESSARY TO LOWER THE M & Q RACK ONE SPACE. THIS IS ACCOMPLISHED AS FOLLOWS:

IN ITS NORMAL POSITION, THE M & Q RACK RESTS ON ROLL (E) PLATE 8, OF THE NEGATIVE MULTIPLY TYPE DRIVE SHAFT ASSEMBLY (3). SHAFT ASSEMBLY (3) PLATE 8A, IS NORMALLY HELD IN POSITION BY ROLL (34) LIMITING AGAINST THE MULTIPLY ZERO TYPE DRIVE SLIDE (31). WHEN THE ZERO MULTIPLY KEY IS DEPRESSED, SLIDE (31) MOVES REARWARD. SLOPE (W) PERMITS NEGATIVE MULTIPLY TYPE DRIVE SHAFT (3) TO ROTATE UNDER TENSION OF SPRING (35), LOWERING THE M & Q RACK ONE SPACE TO ZERO PRINTING POSITION.

AS THE MULTIPLY ZERO TYPE DRIVE SLIDE (31) MOVES TO THE REAR, EXTENSION (H) PLATE 8, OF THE SLIDE IS POSITIONED UNDER EXTENSION (12A) OF THE NEGATIVE MULTIPLY TYPE DRIVE CAM LINK (12) TO PREVENT RAISING M & Q RACK.

D. NEGATIVE MULTIPLY TYPE DRIVE CAM RETURN PAWL

THE PURPOSE OF THE NEGATIVE MULTIPLY TYPE DRIVE CAM RETURN PAWL (18) PLATE 8A, IS TO PICK UP AND RESTORE THE NEGATIVE MULTIPLY TYPE DRIVE CAM LINK (12) PLATE 8, IMMEDIATELY ON THE RETURN STROKE TO ENABLE THE STOP SECTION TO RESTORE WHEN MULTIPLYING BY 1, IF A SIGNIFICANT FIGURE IS IN THE UNITS COLUMN OR THE RELEASE KEY IS USED. THE OPERATION IS AS FOLLOWS:

AS THE BACKSPACE CAM (1) PLATE 8A, MOVES DOWN, THE NEGATIVE MULTIPLY TYPE DRIVE CAM RETURN PAWL (18) WILL MOVE DOWN WITH IT. STEP OF PAWL (18) WILL MOVE UNDER ROLL (A) PLATE 8, AT TOP OF THE NEGATIVE MULTIPLY TYPE DRIVE CAM LINK (12) THROUGH YIELDING SPRING (37) PLATE 8A. ON THE RETURN STROKE, AS THE BACKSPACE CAM (1) RESTORES, STEP OF PAWL (18) WILL PICK UP ROLL (A) RESTORING THE NEGATIVE MULTIPLY TYPE DRIVE CAM LINK (12) AT THE VERY BEGINNING OF THE RETURN STROKE. THIS WILL CAUSE EXTENSION (G) PLATE 8, OF CAM ASSEMBLY (12) TO RELEASE STUD (F) SO THAT SHAFT ASSEMBLY (3) AND MULTIPLY REPEAT ARM (20) PLATE 8A, WILL RESTORE AT THE SAME TIME, LOWERING THE PLUNGER (22) AND PERMITTING THE STOP SECTION TO CLEAR.

E. NEGATIVE MULTIPLY TYPE DRIVE CAM RETURN PAWL LATCH

FAILURE OF THE NEGATIVE MULTIPLY TYPE DRIVE CAM RETURN PAWL (18) PLATE 8A, TO BE LATCHED BY NEGATIVE MULTIPLY TYPE DRIVE CAM RETURN PAWL LATCH (17) AT THE BEGINNING OF THE FIRST FORWARD STROKE OF A SHORT-CUT MULTIPLIER, WOULD CAUSE PAWL (18) TO GET UNDER ROLL (A) PLATE 8, OF THE NEGATIVE MULTIPLY TYPE DRIVE CAM LINK (12). THIS ACTION WOULD BLOCK THE TRAVEL OF CAM ASSEMBLY (12) AND THE M & Q RACK WOULD BE MOVED TO THE NUMBER "1" PRINTING POSITION INSTEAD OF THE "5".

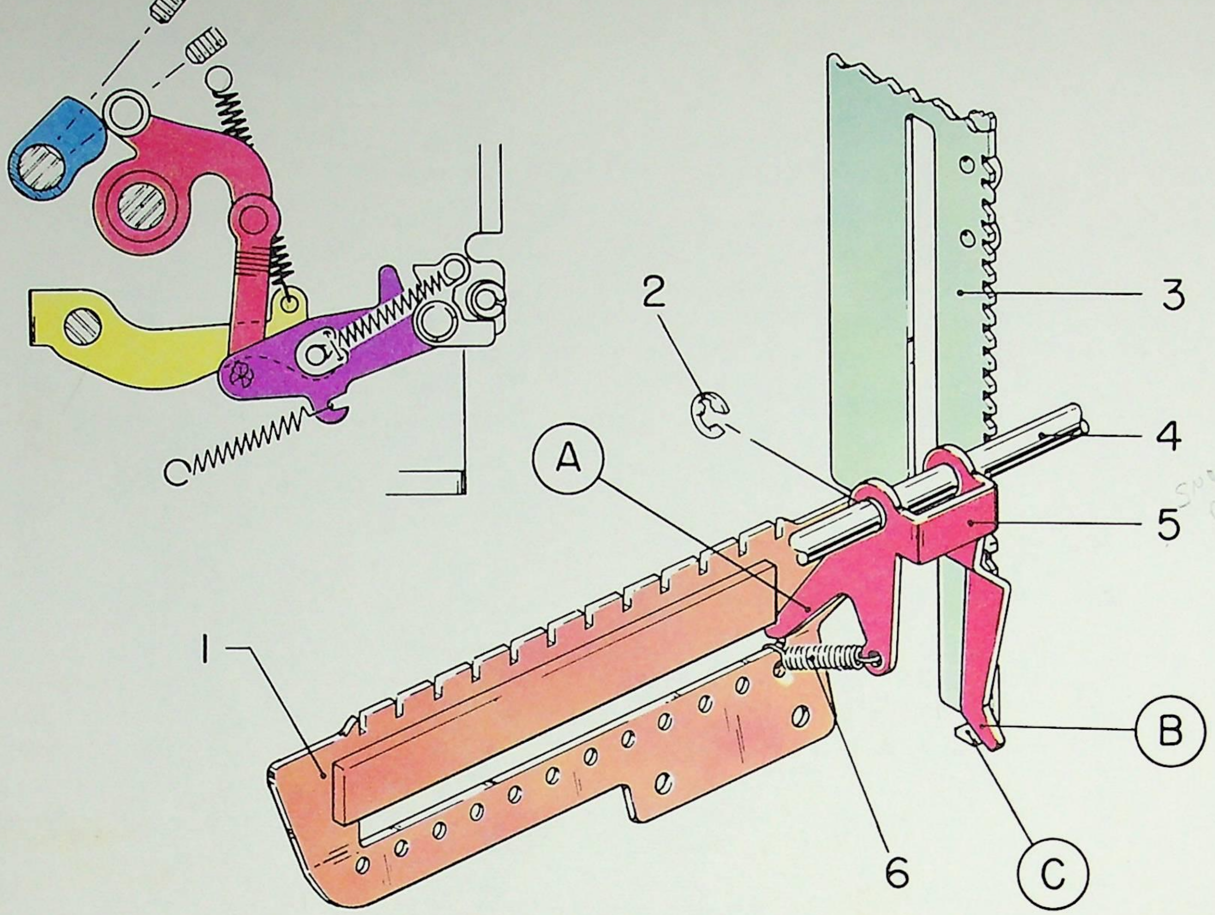
F. AUXILIARY TYPE CARRIER LIMIT ARM LATCH

THE PURPOSE OF AUXILIARY TYPE CARRIER LIMIT ARM LATCH (15) PLATE 8, IS TO RELATCH TYPE CARRIER LIMIT LATCH (4) AT THE END OF THE FORWARD STROKE WHEN MULTIPLYING BY ONE TO PREVENT LIMIT LATCH (4) FROM MOVING IN PATH OF EXTENSION (C) ON M & Q RACK AS M & Q IS FED ON RETURN STROKE. THIS IS NECESSARY SINCE SLIDE (7) RESTORES ON RETURN STROKE RATHER THAN ON FORWARD STROKE, PREVENTING TYPE CARRIER LIMIT LATCH RETAINING ARM (13) FROM LATCHING LIMIT LATCH (4).

THE PURPOSE OF STUD (V) PLATE 8A, ON NEGATIVE MULTIPLY RETAINING LATCH (23) IS TO PREVENT LATCH (23) FROM JARRING OFF AND RELEASING NEGATIVE MULTIPLY TYPE DRIVE PAWL (24). IF LATCH (23) DID JAR OFF PAWL (24) AND THE MACHINE OPERATED WITHOUT MULTIPLY NON-PRINT BELLCRANK (8) PLATE 8, RELEASED, STUD (U) PLATE 8A, IN UPPER PORTION OF NEGATIVE MULTIPLY MOTOR DRIVE ARM (25) WOULD LIMIT ON TOP OF FORK IN REAR PORTION OF BELLCRANK (8). THIS WOULD CAUSE MACHINE TO LOCK UP, RESULTING IN PARTS BEING STRAINED AND NUMEROUS ADJUSTMENTS THROWN OFF.

M & Q RACK SNUBBER ARM
PLATE 8B

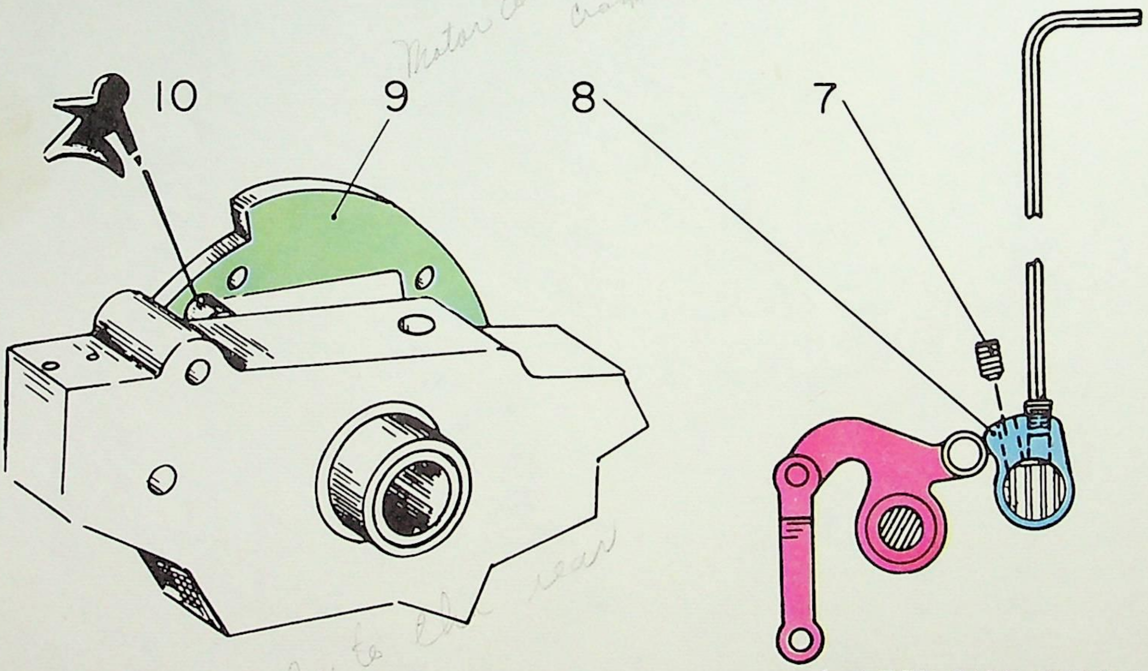
THE M & Q RACK SNUBBER ARM (5) IS PROVIDED TO PREVENT THE M & Q RACK (3) FROM BOUNCING WHEN RESTORING TO NORMAL REST POSITION. THE SNUBBER ARM PIVOTS ON THE HAMMER TRIP SHAFT (4) AND IS HELD IN POSITION BY SPRING (6) WITH THE ANGULAR EXTENSION (B) JUST ABOVE THE LOWER EXTENSION (C) OF THE M & Q RACK (3). IN ORDER FOR THE M & Q RACK TO MOVE UPWARD, IT SIMPLY CAMS THE SNUBBER ARM (5) TO THE REAR. THE TENSION OF THE SNUBBER ARM SPRING IS SUFFICIENT ENOUGH TO PREVENT THE M & Q RACK FROM BOUNCING AS IT NORMALIZES, BUT NOT SO STRONG AS TO INTERFERE WITH THE M & Q RACK MOVING UPWARD.



SNUBBER ARM

(RIGHT SIDE VIEW)

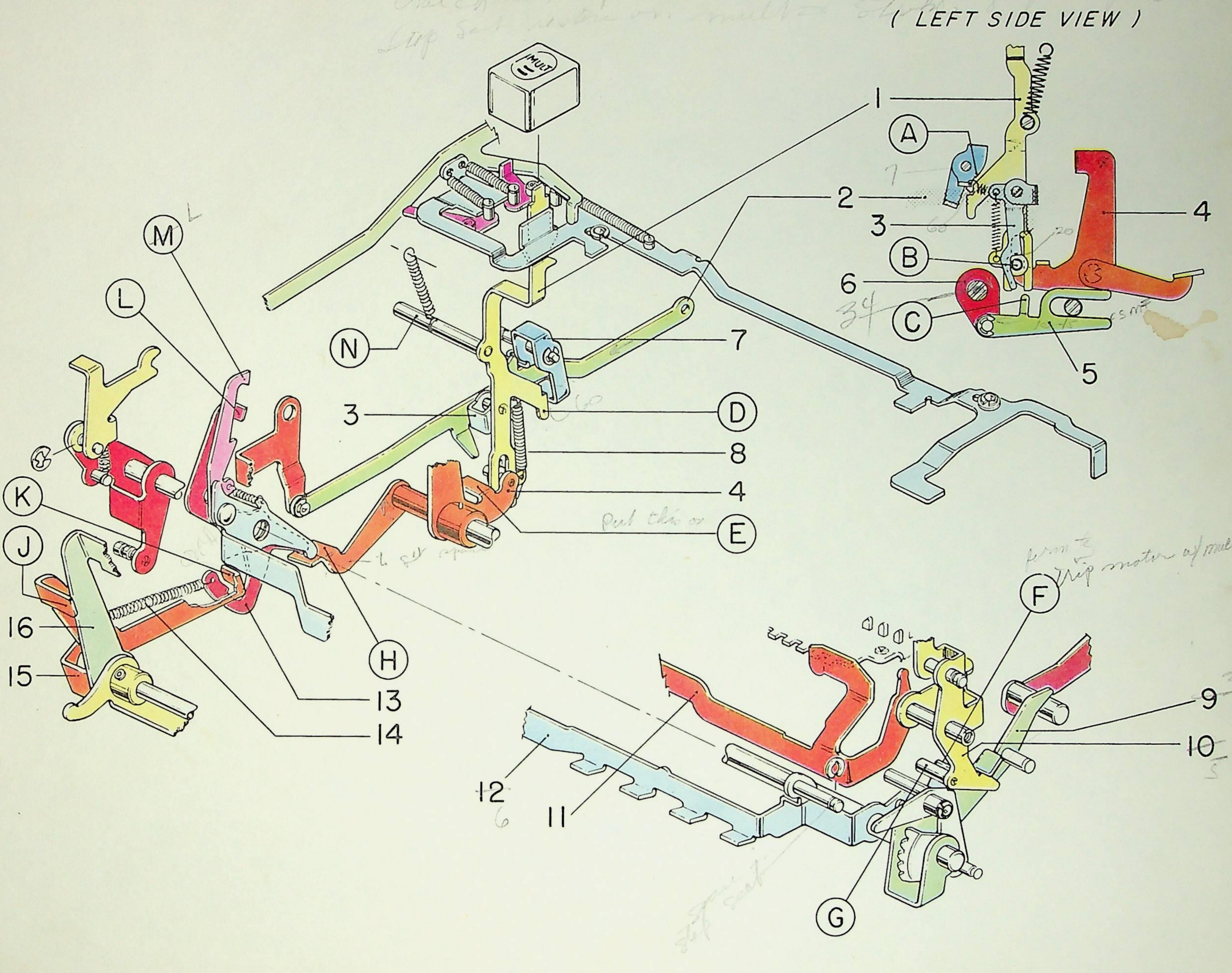
Motor drive clamp



to far to the rear

(LEFT SIDE VIEW)

Latch & trip motor last ? 2 strips of [illegible] parts -
Stop set motor on mult = Stops [illegible]



Put this or

perm to trip motor w/mult =

Stop seat

PLATE 9

MULT. TOTAL KEY

MULT TOTAL KEY OPERATION

PLATES 9 & 9A

THE MULT TOTAL KEY OPERATION SIMPLIFIES MULTIPLICATION BY ALLOWING OPERATOR TO USE SPACE AND MEMORY KEYS TO SET SPACES TO RIGHT OF MULTIPLICAND IN PREFERENCE TO MENTALLY INDEXING MULTIPLICAND DIGITS AND THEN DEPRESSING SPACE KEY FOR EACH SPACE DESIRED. A MECHANISM FOR ELIMINATING ZERO PRINT TO RIGHT OF PRODUCT ON TOTAL OPERATION IS INCLUDED WITH THIS MECHANISM. THIS OPERATION IS APPLICABLE TO MULTIPLICATION ONLY BUT DOES NOT INTERFERE WITH REGULAR METHOD OF MULTIPLYING.

WHEN MULTIPLICAND IS ENTERED IN STOP SECTION, THE BLANK STROKE LOCK BELLCRANK (11) PLATE 9, WILL ROCK, BRINGING OUTER CREDIT BALANCE BLOCK ARM CONNECTING LINK (2) TO FRONT OF MACHINE RELEASING EXTENSION (A) FROM MULT TOTAL KEYSTEM LATCH (7) ALLOWING IT TO REST AGAINST EXTENSION (D) OF MULT TOTAL KEYSTEM (1).

WHEN MULT TOTAL KEY (1) IS DEPRESSED, SCREW STUD (N) WILL BE LOWERED, PERMITTING HAMMER BLOCK SLIDE LATCH DRIVE PAWL (18) PLATE 9A, THROUGH SPRING (36) TO LATCH OVER ROLL (W) ON HAMMER BLOCK SLIDE LATCH DRIVE ARM (17). AT THE SAME TIME, MULT TOTAL KEYSTEM PAWL (3) PLATE 9, WILL CONTACT STUD (B) AND ROTATE SPACE-OVER BELLCRANK SHAFT ARM (4). EXTENSION (V) PLATE 9A, ON SPACE-OVER BELLCRANK SHAFT ARM (4) WILL DRIVE NON-ADD LINK (21) TO REAR, POSITIONING NON-ADD MECHANISM. SPACE-OVER BELLCRANK SHAFT ARM (4) ALSO MOVES MULT TOTAL LINK (19) REARWARD, POSITIONING ARM (A) IN FRONT OF LATCH (B) WHICH SETS UP AUTOMATIC TOTAL MECHANISM. THIS WILL PERMIT STOP SECTION TO CLEAR AND MACHINE TO TAKE AUTOMATIC BLANK STROKE AND TOTAL. EXTENSION (H) PLATE 9, ON LEFT ARM OF SPACE-OVER BELLCRANK SHAFT ARM (4) WILL OPERATE NEGATIVE MULT TYPE DRIVE BAIL (12) AND NEGATIVE MULT CUT-OUT ARM (13). AS BAIL (12) ROTATES, SPACE KEY BAIL OPERATING PAWL (5) PLATE 5, WILL ROTATE SPACE KEY OPERATING BAIL (4) WHICH DEPRESSES A SPACE STOP AND ESCAPES STOP SECTION ONE SPACE TO LEFT. EXTENSION (F) PLATE 9, ON RIGHT END OF BAIL (12) WILL CONTACT STUD (G) ON MOTOR DRIVE CONTROL ARM LATCH (10), RELEASING MOTOR DRIVE CONTROL ARM (9) WHICH TRIPS THE MOTOR. AS NEGATIVE MULT CUT-OUT ARM (13) IS OPERATED, IT WILL MOVE NEGATIVE MULT MOTOR DRIVE ENGAGING PAWL (M) FORWARD TO PREVENT SETTING UP SHORT-CUT MECHANISM. MULT TOTAL KEYSTEM (1) WILL BECOME LATCHED WITH MULT TOTAL KEYSTEM LATCH (7) TO HOLD PARTS IN POSITION.

AS THE MAINSHAFT MOVES FORWARD, HAMMER BLOCK SLIDE LATCH DRIVE PAWL (18) PLATE 9A, MOUNTED ON LEFT UNIVERSAL SHAFT ARM (37), WILL CONTACT ROLL (W), ROTATING HAMMER BLOCK SLIDE LATCH DRIVE ARM (17) AND HAMMER BLOCK SLIDE LATCH PIVOT SHAFT (34) FORWARD. ARMS (32) PINNED TO PIVOT SHAFT (34) WILL LOWER LATCH RELEASE BAIL SHAFT (33) AWAY FROM FRONT EXTENSIONS (Q) ON HAMMER BLOCK SLIDE LATCHES (24), PERMITTING HOOKED PORTION (S), THROUGH TENSION OF SPRINGS (25), TO ENGAGE EARS (R) ON HAMMER BLOCK SLIDES (26) WHEN ACCUMULATOR RACKS (27) ARE IN SPACE POSITION OR REST ON EARS (R) IF ACCUMULATOR RACKS (27) ARE BEYOND SPACE POSITION. AT THE SAME TIME, HAMMER BLOCK SLIDE LATCH BAIL (23) WILL BE POSITIONED ABOVE EXTENSIONS (Q) OF LATCHES (24) ENGAGED WITH SLIDES (26) AND BELOW EXTENSIONS (Q) DISENGAGED WITH SLIDES (26). HAMMER BLOCK SLIDE LATCH PIVOT SHAFT (34), HAMMER BLOCK SLIDE LATCH BAIL (23) AND HAMMER BLOCK SLIDE LATCHES (24) WILL REMAIN POSITIONED BY PIVOT SHAFT LATCH (31) UNTIL THE TOTAL STROKE. THIS WILL PREVENT UNNECESSARY ZERO PRINT TO RIGHT OF THE PRODUCT ON TOTAL OPERATION. AT THE END OF THE FORWARD STROKE, EXTENSION (C) PLATE 9, ON MULT LATCH KICK-OFF LINK (5) WILL CONTACT AND RELEASE MULT TOTAL KEYSTEM PAWL (3) FROM STUD (B) ON SPACE-OVER BELLCRANK SHAFT ARM (4). THIS WILL PERMIT SPACE-OVER BELLCRANK SHAFT ARM (4), NEGATIVE MULT TYPE DRIVE BAIL (12), NEGATIVE MULT CUT-OUT ARM (13), NON-ADD LINK (21) PLATE 9A, AND MULT TOTAL LINK (19) TO RESTORE.

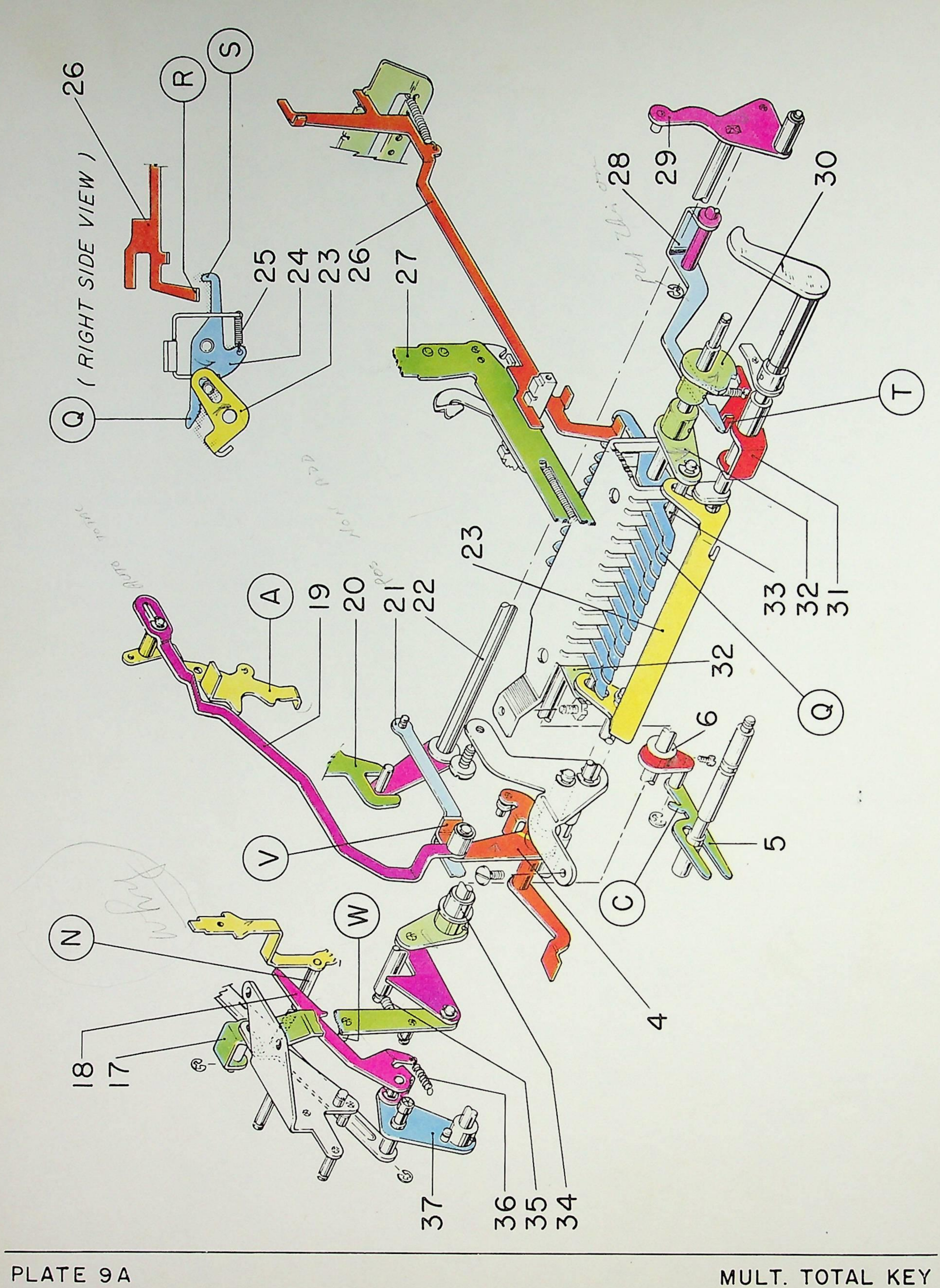


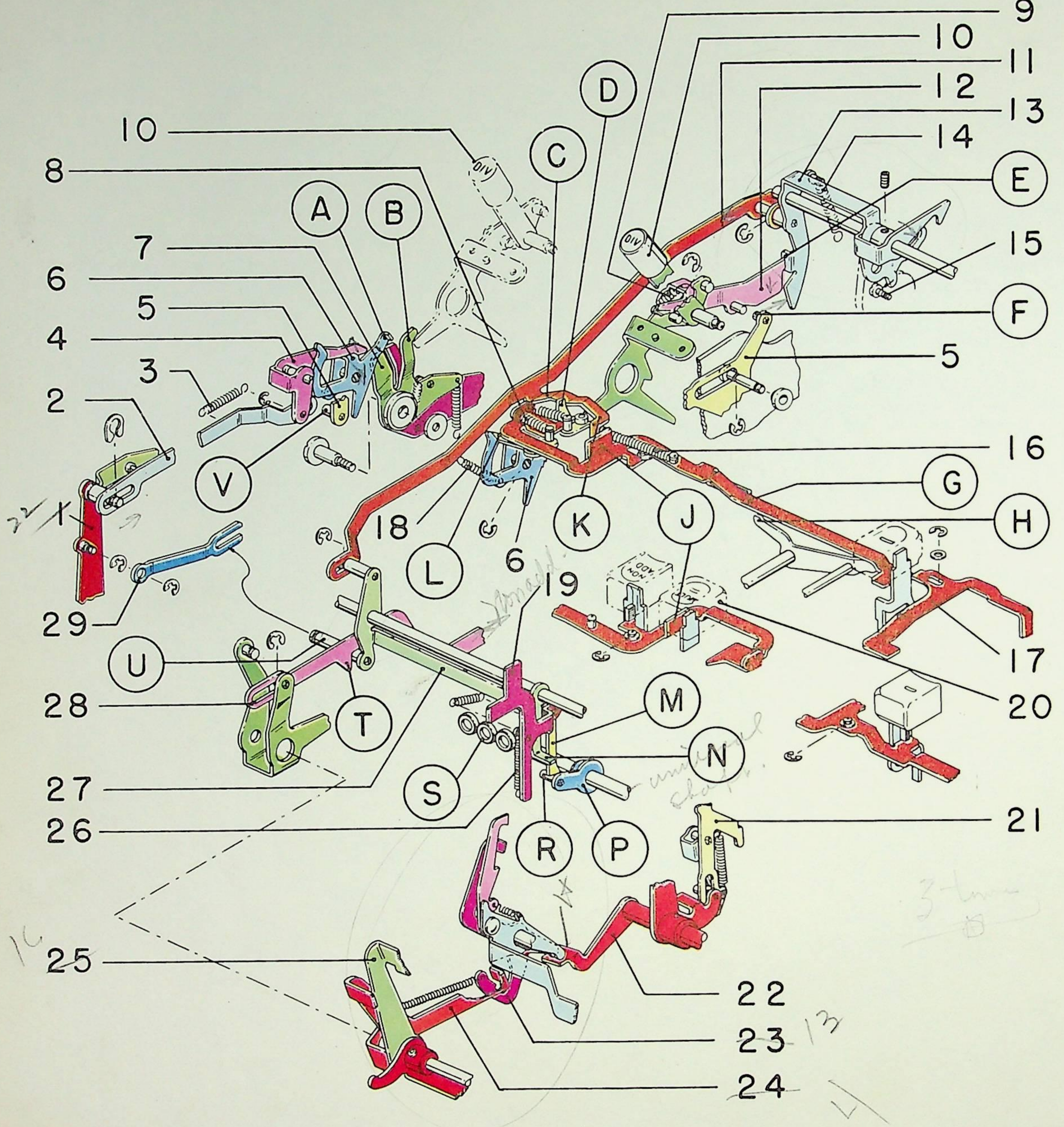
PLATE 9A

MULT. TOTAL KEY

MULT TOTAL KEY OPERATION (CONT'D.)

ON RETURN STROKE OF MAINSHAFT, MACHINE WILL NON-PRINT, NON-ADD AND CLEAR THE STOP SECTION. AS STOP SECTION RESTORES, BLANK STROKE LOCK BELLCRANK (11) PLATE 9, WILL ROCK FORWARD, MOVING OUTER CREDIT BALANCE BLOCK ARM LINK (2) REARWARD. EXTENSION (A) ON LINK (2) WILL UNLATCH MULT TOTAL KEYSTEM LATCH (7) FROM MULT TOTAL KEYSTEM (1), ALLOWING KEYSTEM (1) AND HAMMER BLOCK SLIDE LATCH DRIVE PAWL (18), PLATE 9A, TO RESTORE.

ON THE FORWARD STROKE OF TOTAL STROKE, TOTAL SLIDE (20) WILL MOVE REARWARD, ROCKING FEATURE KEY LATCH SHAFT (22). THROUGH RIGHT FEATURE KEY SHAFT ARM (29) TOTAL RELEASE PAWL (28) WILL OVER-LATCH EAR (T) ON PIVOT SHAFT LATCH (31). ON RETURN STROKE, AS TOTAL SLIDE (20) RESTORES, TOTAL RELEASE PAWL (28) WILL UNLATCH PIVOT SHAFT LATCH (31) FROM PIVOT SHAFT LATCH ARM (30), PERMITTING SHAFT (34), LATCH RELEASE BAIL SHAFT (33), HAMMER BLOCK SLIDE LATCH BAIL (23) AND HAMMER BLOCK SLIDE LATCHES (24) TO RESTORE THROUGH TENSION OF SPRING (35). AT THE SAME TIME, MULT LATCH KICK-OFF LINK (5) PLATE 9, WILL RESTORE PERMITTING MULT TOTAL KEYSTEM PAWL (3) TO MOVE OVER STUD (B) IN SPACE-OVER BELLCRANK SHAFT ARM (4) THROUGH SPRING (8).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M
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universal shaft
27
S
26
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3-times
14
~~25~~
22
~~23~~ 13
~~24~~ 4
DIV
NON ADD
check

INTERLOCK OPERATIONS

PLATES 10 & 11

A. DIVISION INTERLOCK

Set up when the mult key is depressed.

Set up mult key To block

AS A MULTIPLY KEY IS DEPRESSED, THE MULTIPLY NON-PRINT BELLCRANK (1) PLATE 10, MOVES DIVISION INTERLOCK ARM LATCH LINK (2) REARWARD, RAISING DIVISION INTERLOCK ARM LATCH (4). THE DIVISION INTERLOCK BLOCK ARM (6) WILL MOVE UNDER THE TENSION OF SPRING (18) TO BLOCK THE DIVISION CONTROL ARM (7) BY POINT (A) DROPPING IN FRONT OF POINT (B) SO THAT THE DIVISION KEY (10) CANNOT BE DEPRESSED. THE UPPER EXTENSION OF BLOCK ARM (6) WILL CONTACT EXTENSION (L), POSITIONING THE MULTIPLY AND DIVISION KEYBOARD INTERLOCK SLIDE (17) TO THE RIGHT, CAUSING EXTENSION (G) TO MOVE OVER EXTENSION (H), BLOCKING THE UNIVERSAL BAR. AT THE SAME TIME, SLIDE (17) WILL BLOCK THE NON-ADD KEY, SUBTRACT KEY AND TOTAL BAR.

THIS INTERLOCK WILL REMAIN IN EFFECT UNTIL THE TOTAL OPERATION. AS THE TOTAL SLIDE (5) MOVES TO THE REAR, STUD (V) WILL CONTACT THE LOWER EXTENSION OF BLOCK ARM (6) MOVING THE UPPER EXTENSION OF (6) AWAY FROM EXTENSION (L) AND PERMIT SPRING (16) TO RESTORE SLIDE (17). ALSO EXTENSION (A) WILL RAISE OUT OF THE PATH OF EXTENSION (B). BLOCK ARM (6) WILL BE RELATCHED WITH INTERLOCK ARM LATCH (4).

B. MULTIPLICATION INTERLOCK

Set up when the division is depressed.

reverse catches lockout keyboard

DEPRESSION OF THE DIVISION KEY (10) LOWERS THE REAR OF THE PRINTING HAMMER CATCH BLOCK ARM (12) BELOW EXTENSION (E) OF PRINTING HAMMER CATCH ASSEMBLY (13). CATCH ASSEMBLY (13) WILL ROTATE THROUGH SPRING (14) UNTIL IT LIMITS AGAINST SCREW (15). THIS WILL BLOCK THE MULTIPLY HAMMER AND RELEASE THE DIVISION HAMMER. AT THE SAME TIME, MOVING MULTIPLY INTERLOCK BAIL OPERATING LINK (11) FORWARD. EXTENSION (C) OF LINK (11) WILL CONTACT EXTENSION (D) AND, THROUGH YIELD SPRINGS (8), WILL POSITION MULTIPLY AND DIVISION KEYBOARD INTERLOCK SLIDE (17) TO THE RIGHT, MOVING EXTENSION (G) OVER EXTENSION (H), BLOCKING THE UNIVERSAL BAR, ALSO BLOCKING THE NON-ADD, SUBTRACT KEY AND TOTAL BAR. THE FRONT END OF LINK (11) WILL ROTATE THE MULTIPLY INTERLOCK BAIL (27) CAUSING EXTENSION (N) TO MOVE PAWL (M) OFF STUD (R) OF ARM (P) AND PERMIT THE KEYSTEM INTERLOCK (19) TO MOVE DOWN THROUGH SPRING (26), SPREADING ROLLS (S) TO BLOCK THE MULTIPLY KEYS.

THIS INTERLOCK WILL REMAIN IN EFFECT UNTIL THE TOTAL OPERATION. AS THE TOTAL SLIDE (5) MOVES REARWARD, STUD (F) WILL CONTACT THE LOWER EXTENSION OF BAIL (13) DRIVING IT REARWARD AND PERMIT BLOCK ARM (12) TO MOVE BACK UP TO A BLOCKING POSITION THROUGH SPRING (9). AS BAIL (13) RESTORES, THE DIVISION HAMMER WILL BE BLOCKED AND THE MULTIPLY HAMMER WILL BE RELEASED. AS LINK (11) MOVES REARWARD, EXTENSION (C) WILL RELEASE EXTENSION (D) AND PERMIT SLIDE (17) TO RESTORE, UNLOCKING THE UNIVERSAL BAR, SUBTRACT, NON-ADD KEY AND TOTAL BAR. THE FRONT END OF LINK (11) WILL PERMIT BAIL (27) TO RESTORE AND PAWL (M) WILL MOVE OVER STUD (R) WHILE THE MAINSHAFT IS FORWARD. ON THE RETURN STROKE, STUD (R) WILL DRIVE PAWL (M) AND INTERLOCK (19) UP OUT OF BLOCKING POSITION OF MULTIPLY KEYS.

C. MAINSHAFT INTERLOCK

THE MULTIPLY KEYS ARE BLOCKED AND CANNOT BE DEPRESSED WHEN THE MAINSHAFT IS OUT OF NORMAL POSITION BY THE KEYSTEM INTERLOCK (19). NORMALLY, THE KEYSTEM INTERLOCK IS HELD IN ITS UPWARD POSITION AS FOLLOWS: PAWL (M) ON THE KEYSTEM INTERLOCK (19) RESTS ON STUD (R) ON THE KEYSTEM INTERLOCK ARM (P) WHICH IS PINNED TO THE UNIVERSAL DRIVE SHAFT. AS THE MAINSHAFT TURNS FORWARD, STUD (R) MOVES DOWN, PERMITTING KEYSTEM INTERLOCK (19) TO MOVE DOWN UNDER TENSION OF ITS SPRING (26), CAUSING FRONT EXTENSION OF MULTIPLY KEYSTEM INTERLOCK TO SPREAD LOCK ROLLS (S), PREVENTING THE OPERATOR FROM DEPRESSING A MULTIPLY KEY UNTIL THE MULTIPLY KEYSTEM INTERLOCK (19) IS RESTORED BY STUD (R) WHEN THE UNIVERSAL DRIVE SHAFT RESTORES TO NORMAL POSITION.

D. mult. KEYSTEM INTERLOCK

THE DEPRESSION OF ANY MULTIPLY KEY BLOCKS ALL OTHER MULTIPLY KEYS THROUGH A SERIES OF ROLLS (S) IN AN ENCLOSED CHANNEL. THESE STAINLESS STEEL ROLLS HAVE AN ACCUMULATED CLEARANCE BETWEEN THEM OF JUST ENOUGH SPACE FOR ONE MULTIPLY KEYSTEM TO PASS. THUS, WITH ANY MULTIPLY KEY DEPRESSED, THE ROLLS WILL BLOCK ALL OTHER MULTIPLY KEYS.

E. NON-ADD INTERLOCK

IT IS NECESSARY TO LOCK THE MULTIPLY KEYS WHEN THE NON-ADD KEY IS DEPRESSED TO PREVENT MULTIPLYING AND NON-ADDING AT THE SAME TIME. THIS IS ACCOMPLISHED BY EXTENSION (T) ON THE NON-ADD LINK (28) CONTACTING STUD (U) OF BAIL (27) TO TRIP THE KEYSTEM INTERLOCK (19) AND LOCK THE MULTIPLY KEYS.

F. 0 TO 9 INTERLOCK

IF ANY MULTIPLY KEY IS PARTIALLY DEPRESSED OR "FLICK" OPERATED, THIS WILL RELEASE MULTIPLY NON-PRINT BELLCRANK (1). THIS CAUSES THE MULTIPLY INTERLOCK LINK (29) TO ROTATE MULTIPLY INTERLOCK BAIL (27) CAUSING EXTENSION (N) TO MOVE PAWL (M) OFF STUD (R), PERMITTING KEYSTEM INTERLOCK (19) TO MOVE DOWN THRU SPRING (26) SPREADING ROLLS (S) TO BLOCK MULTIPLY KEYS 0 TO 9 FROM SECOND DEPRESSION. IF MACHINE IS MIS-OPERATED IN THIS MANNER, PULL RELEASE KEY AND DEPRESS "D" KEY. THIS WILL CLEAR STOP SECTION AND UNLOCK MULTIPLY KEYS.

G. MULT TOTAL KEY INTERLOCK

MULT TOTAL KEY (21) IS BLOCKED FROM DEPRESSION WHEN THE MACHINE IS NORMAL OR DURING LISTING OPERATIONS BY EXTENSION (J) OF KEYBOARD INTERLOCK SLIDE (17) UNDER MULT TOTAL KEY BUTTON (20). WHEN MULTIPLY KEY IS DEPRESSED, KEYBOARD INTERLOCK SLIDE (17) WILL BE POSITIONED TO THE RIGHT, MOVING EXTENSION (J) OUT OF BLOCKING POSITION OF MULT TOTAL KEY BUTTON (20).

MULT TOTAL KEY (21) IS BLOCKED FROM DEPRESSION DURING MACHINE OPERATION OF A MULTIPLY KEY BY MULT TOTAL INTERLOCK ARM (24). WHEN MULT KEY IS DEPRESSED, KEYSTEM LOCK BAIL (25) WILL MOVE REARWARD, PERMITTING MULT TOTAL INTERLOCK ARM (24) TO LATCH WITH NEGATIVE MULT CUT-OUT ARM (23), PREVENTING SPACE-OVER BELLCRANK SHAFT ARM (22) FROM ROTATING; THEREFORE, BLOCKING MULT TOTAL KEY (21). ON LAST RETURN STROKE OF MULT KEY OPERATION, KEYSTEM LOCK BAIL (25) WILL BE RESTORED, UNLATCHING MULT TOTAL

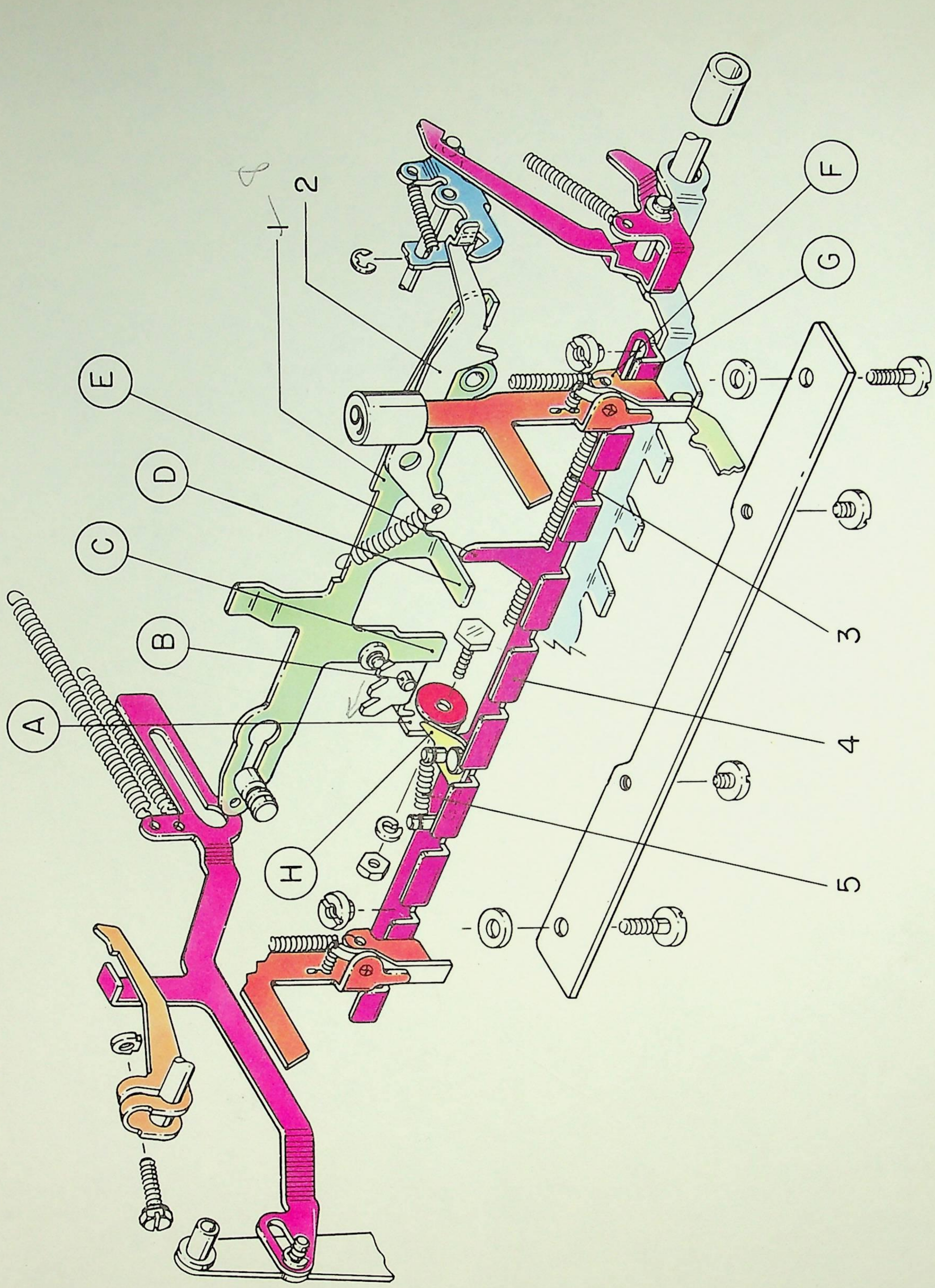


PLATE II INTERLOCKS

INTERLOCK ARM (24) FROM NEGATIVE MULT CUT-OUT ARM (23). THIS WILL ALLOW MULT TOTAL KEY (21) TO BE DEPRESSED.

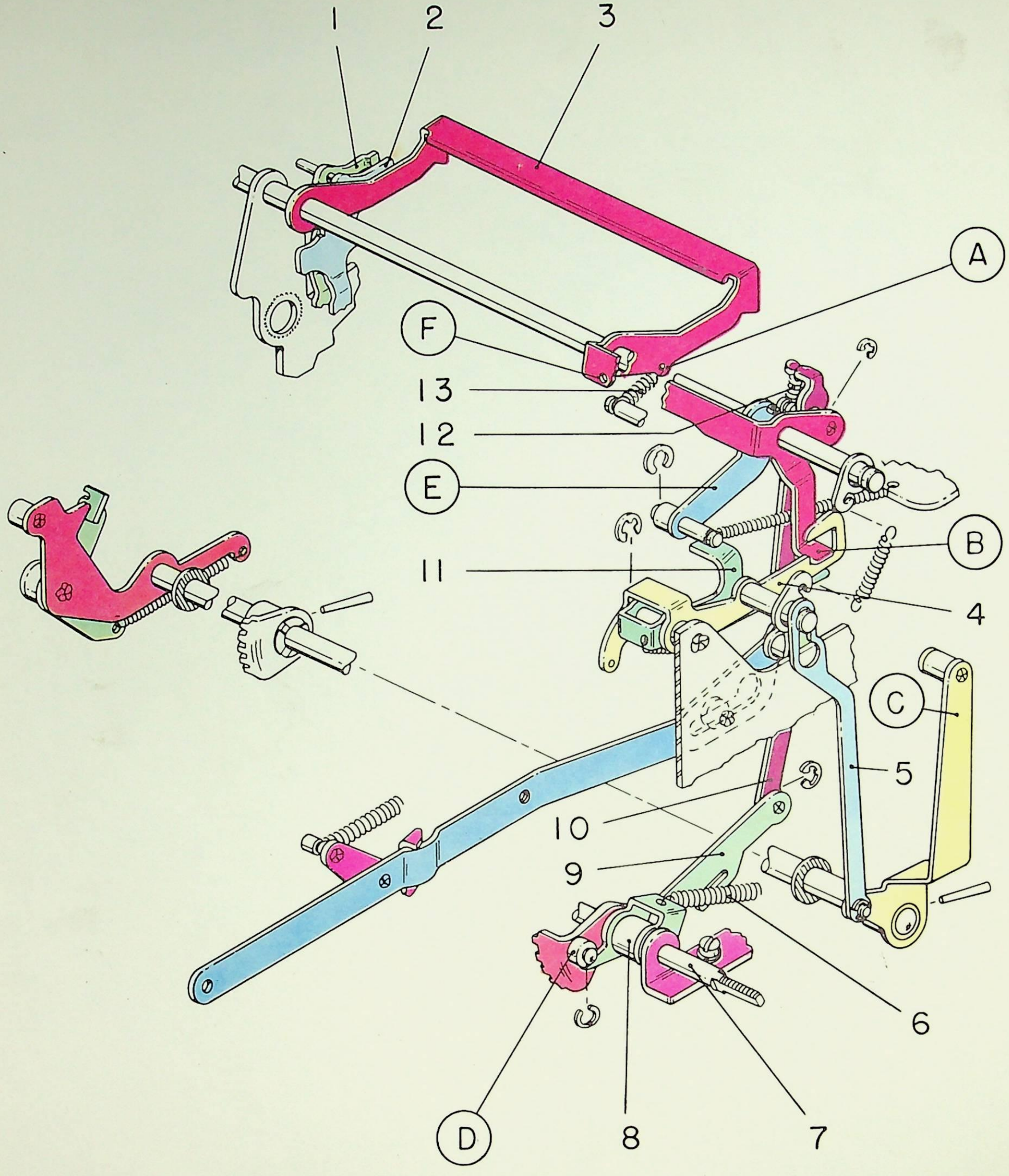
MULT TOTAL KEY (21) IS ALSO BLOCKED FROM DEPRESSION DURING A DIVISION OPERATION. THIS IS ACCOMPLISHED BY EXTENSION (K) ON MULTIPLY INTERLOCK OPERATING LINK (11) MOVING UNDER MULT TOTAL KEY BUTTON (20) AS DIVISION KEY IS DEPRESSED AND PRINTING HAMMER CATCH BLOCK ARM (13) ROTATES MOVING LINK (11) FORWARD. ON THE TOTAL STROKE, TOTAL SLIDE (5) WILL RESTORE BLOCK ARM (13), BRINGING LINK (11) REARWARD, MOVING EXTENSION (K) OUT OF BLOCKING POSITION OF BUTTON (20).

H. STOP SECTION INTERLOCK

WHEN THE STOP SECTION IS IN NORMAL POSITION, EXTENSION (A) PLATE 11, WILL HOLD THE MULTIPLY KEY LOCK SLIDE (4) THROUGH YIELDING PAWL (H), UNDERNEATH THE MULTIPLY KEYSTEMS TO PREVENT THEIR DEPRESSION AS SHOWN BETWEEN POINTS (F) AND (G). AS THE MULTIPLICAND IS ENTERED INTO THE STOP SECTION, THE STOP SECTION MOVES TO THE LEFT. EXTENSION (A) WILL MOVE TO THE LEFT, PERMITTING THE MULTIPLY KEY LOCK SLIDE (4) TO BE PULLED TO THE LEFT UNDER TENSION OF SPRING (3) UNTIL EXTENSION (E) LIMITS ON EXTENSION (D) SO THAT THE MULTIPLY KEYS MAY BE DEPRESSED.

YIELDING PAWL (H) ON THE MULTIPLY KEY LOCK SLIDE (4) ALLOWS THE STOP SECTION TO RESTORE TO NORMAL WHEN A MULTIPLY KEY IS LATCHED DOWN. WHEN THE MULTIPLY KEY RESTORES, YIELDING SPRING (5) WILL MOVE THE SLIDE (4) UNDERNEATH THE MULTIPLY KEYS.

THE PURPOSE OF STUD (B) IS TO CONTACT EXTENSION (C) AND RELATCH SLIDE (1) WITH LATCH (2) IF FOR ANY REASON SLIDE (1) AND LATCH (2) WERE UNLATCHED AND THE CORRECTION KEY USED OR STOP SECTION CLEARED UNDER POWER.



PRINTING CONTROL MECHANISM

PRINTING CONTROL FEATURE

SIMPLA-TAPE

PLATE 12

THE PRINTING CONTROL FEATURE ELIMINATES THE REPEAT PRINTING OF THE DIVISOR DURING A DIVISION PROBLEM OR THE MULTIPLICAND DURING A MULTIPLICATION PROBLEM. AFTER THE BACKSPACER OPERATES ON THE FIRST PRINT OPERATION OF EITHER A MULTIPLICATION OR DIVISION PROBLEM, THE MULTIPLY AND DIVISION NON-PRINT BAIL (3) WILL BE RELEASED TO DROP DOWN AND LIMIT ON THE FRONT TYPE RACK GUIDE COMB TO PREVENT ANY FURTHER PRINT UNTIL THE STOP SECTION RESTORES. THIS ELIMINATES ALL REPEAT PRINT ON THE TAPE WITH THE EXCEPTION OF THE M & Q FIGURES, AND NON-ADD CHARACTER IF THE "O" MULTIPLY KEY IS USED.

WHEN THE MACHINE IS NORMAL, LATCH (4) HOLDS THE MULTIPLIER AND DIVISION NON-PRINT BAIL (3) UP OUT OF THE PATH OF THE PRINTING HAMMERS FOR REGULAR PRINT OPERATIONS. DURING REGULAR MULTIPLICATION OR DIVISION, AS ARM (C) OPERATES ON THE FIRST BACKSPACE OPERATION, LINK (5) WILL BE LOWERED AT THE SAME TIME PULLING LATCH (4) DOWN AND RELEASING IT FROM LIP (B) OF BAIL (3). THIS WILL PERMIT BAIL (3) TO DROP THROUGH SPRING (13) TO BLOCK THE PRINTING HAMMERS. BAIL (3) WILL REMAIN DOWN UNTIL THE STOP SECTION RESTORES. ROLL (D) ON THE RESET GEARS WILL CONTACT THE FORWARD EXTENSION OF ARM (9) ROTATING ARM (9) WHICH RAISES LINK (10) AND THROUGH SPRING (12) WILL RESTORE BAIL (3), PERMITTING LATCH (4) TO RELATCH LIP (B).

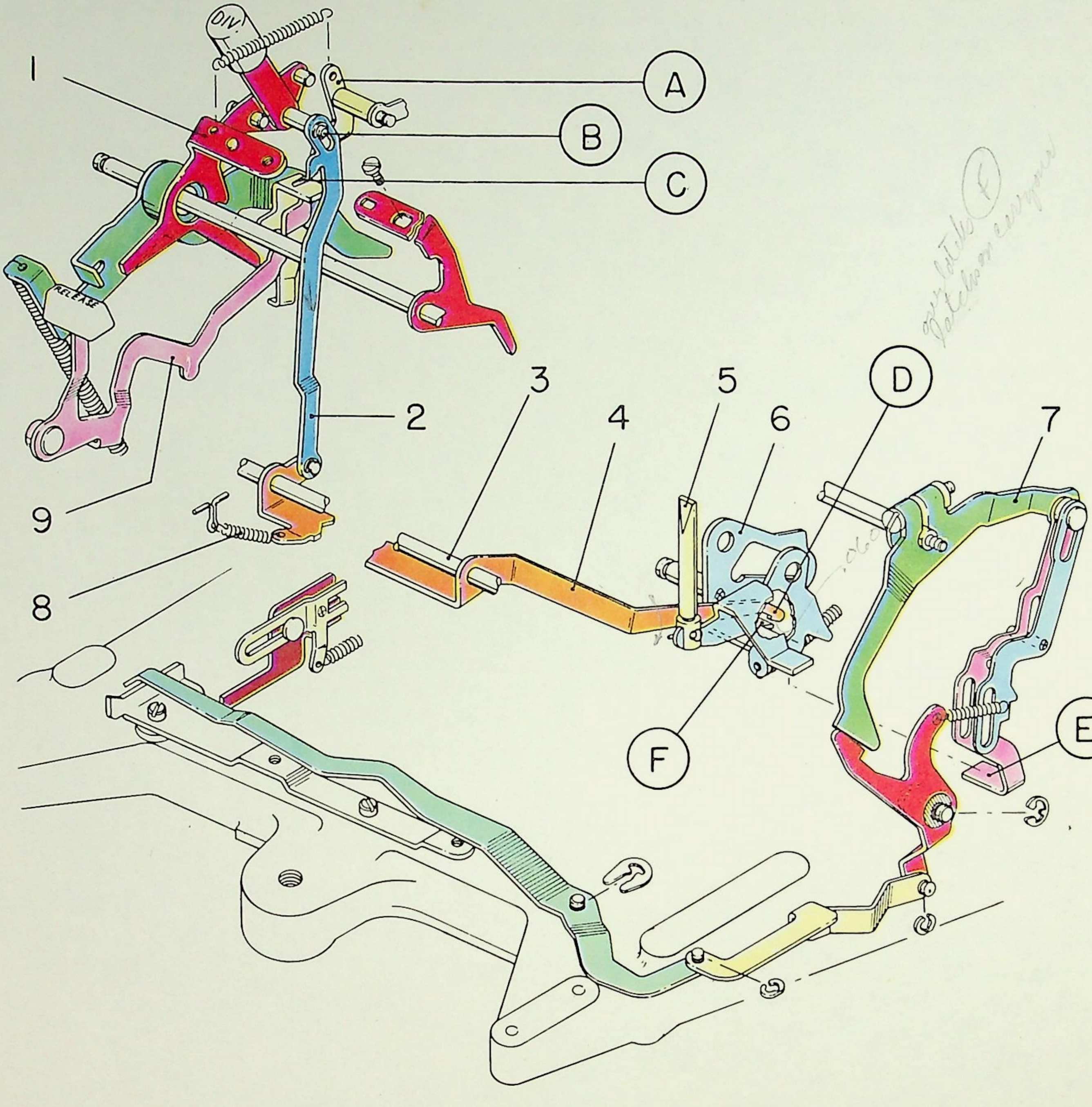
IF THE FIRST MULTIPLIER IS A SHORT-CUT MULTIPLIER, THE MACHINE WILL BACKSPACE ON THE FIRST RETURN STROKE BEFORE A PRINT OPERATION TAKES PLACE. THEREFORE, IT IS NECESSARY TO PREVENT BAIL (3) FROM DROPPING AT THIS TIME. THIS IS ACCOMPLISHED BY LATCH (11) MOVING UP TO BLOCK LIP (B) OF BAIL (3) AS ARM (E) OF THE PRINTING HAMMER CATCH SHAFT IS RAISED ON THE FIRST RETURN STROKE. AT THE SAME TIME, ARM (C) AND LINK (5) WILL LOWER LATCH (4) AND LIP (B) WILL BECOME LATCHED WITH LATCH (11). AFTER PRINTING ON THE LAST RETURN STROKE OF THIS OPERATION, AS THE MACHINE BACKSPACES AND THE PRINTING HAMMER CATCH SHAFT RESTORES, ARM (E) WILL LOWER LATCH (11) PERMITTING BAIL (3) TO DROP AND REMAIN DOWN UNTIL THE STOP SECTION RESTORES.

SPRING (13) MAY BE UNHOOKED FROM HOLE (A) AND HOOKED TO HOLE (F) TO MAKE THE MULTIPLY AND DIVISION NON-PRINT BAIL (3) INOPERATIVE WHILE SERVICING A MACHINE.

THE BACKSPACE DRIVE ARM, PLATE 5, IS NOW OF TWO-PART CONSTRUCTION SO THAT USE OF THE MANUAL BACKSPACE SLIDE WILL NOT CAUSE LATCH (4) TO RELEASE BAIL (3) TO BLOCK THE HAMMERS. THE BACKSPACE DRIVE ARM, SHORT (11) PLATE 5, IS CLAMPED TO THE SHAFT AND, WHEN OPERATED, WILL PICK UP THE STUD IN THE BACKSPACE DRIVE ARM, LONG, TO OPERATE THE BACKSPACE PAWL (10) AND STOP SECTION IN NORMAL MANNER. THE MANUAL BACKSPACE SLIDE OPERATES ONLY THE BACKSPACE DRIVE ARM, LONG.

Purpose of this shaft.

overlatch (F) latches carriage



REPEAT SHAFT ARM LATCH

REPEAT SHAFT ARM LATCH

PLATE 13

A MECHANISM HAS BEEN ADDED TO PREVENT THE PREMATURE RESTORING OF THE STOP SECTION DURING DIVISION. THIS MECHANISM CONSISTS OF LATCH OPERATING LINK (2) FASTENED TO STUD (B) IN DIVISION KEY (1) AND HAS AN EXTENSION (C) RESTING JUST ABOVE LATCH (A) RIVETED TO LEFT SIDE FRAME. THE OTHER END OF LATCH OPERATING LINK (2) IS CONNECTED TO THE REPEAT SHAFT ARM LATCH (4) WHICH PIVOTS ON THE FEATURE KEY LATCH SHAFT (3). THE LATCHING EXTENSION (D) OF THE REPEAT SHAFT ARM LATCH (4) NORMALLY RESTS ABOVE THE REAR EDGE (F) OF THE REPEAT SHAFT ARM (6).

WHEN THE DIVISION KEY (1) IS DEPRESSED, STUD (B) WILL LOWER LINK (2) PERMITTING BAIL (4) TO ROTATE ON THE FEATURE KEY LATCH SHAFT (3) UNDER THE TENSION OF SPRING (8) AND LOWER EXTENSION (D) OF THE REPEAT SHAFT ARM LATCH (4) TO OVER-LATCH LIP (F) OF THE REPEAT SHAFT ARM (6) WHEN THE INNER LINK (E) ON THE RIGHT DIVISION SHAFT ARM (7) RAISES THE REPEAT SHAFT ARM (6).

WHEN THE DIVISION KEY (1) RESTORES, STUD (B) WILL RAISE LINK (2) WHICH IN TURN WILL ROTATE THE REPEAT SHAFT ARM LATCH (4) UPWARD AND UNLATCH EXTENSION (D) FROM LIP (F). THIS WILL PERMIT THE PLUNGER (5) TO DROP AND THE STOP SECTION RESTORING LINK TO RESTORE THE STOP SECTION TO NORMAL ON THE ADD-BACK STROKE.

OPERATION OF THE RELEASE KEY DURING DIVISION WILL ACTUATE LATCH (A), THROUGH RELEASE KEY EXTENSION (9). LATCH (A) WILL CONTACT LIP (C) TO RAISE LINK (2) AND NORMALIZE REPEAT SHAFT ARM LATCH (4), UNLATCHING THE REPEAT SHAFT ARM (6). THE REPEAT SHAFT ARM (6) IS THEN FREE TO RESTORE WHEN THE RIGHT DIVISION SHAFT ARM (7) IS UNLATCHED, LOWERING INNER LINK (E).

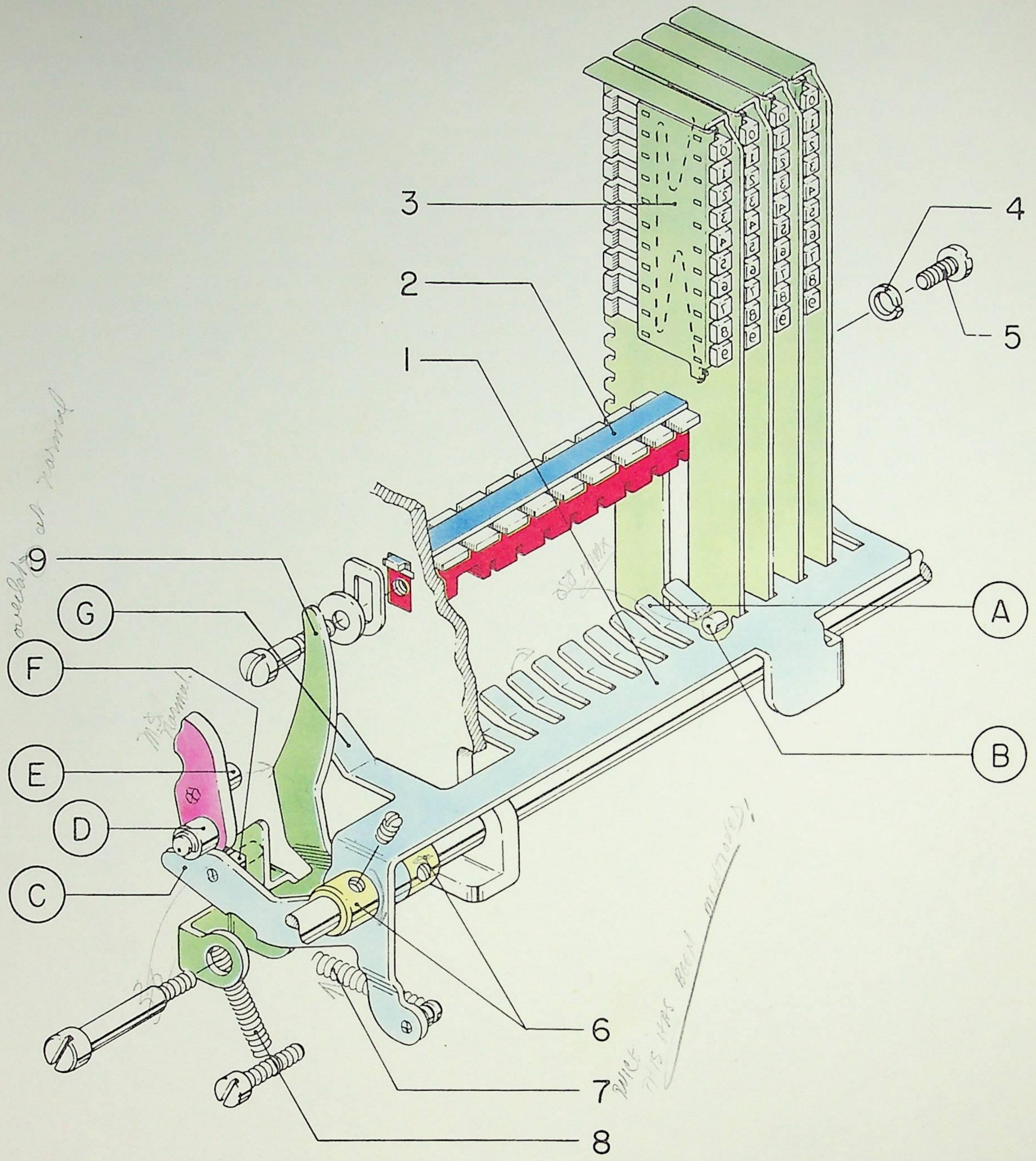


PLATE 14 TYPE RACK LOCK BAIL

TYPE RACK LOCK BAIL

PLATE 14

THE PURPOSE OF THE TYPE RACK LOCK BAIL (1) IS TO PREVENT THE TYPE RACKS (3) FROM FALLING FROM THE MACHINE IN THE EVENT THE MACHINE WOULD BE IN CARRY POSITION AND TURNED UPSIDE DOWN. IT ALSO PREVENTS TYPE RACKS (3) FROM REBOUNDING WHEN RESTORING, PARTICULARLY ON FAST OPERATIONS, AS IN MULTIPLICATION OR DIVISION.

THE LAST THREE TEETH AT THE REAR OF THE ADDING RACKS HAVE BEEN REMOVED TO ENABLE THE ADDING RACKS TO DISENGAGE FROM THE TYPE RACK OPERATING GEARS WHEN CARRYING. THIS WAS NECESSARY DUE TO THE INCREASED CAPACITY, WHICH REQUIRES A FASTER CARRY. THE DISENGAGING ELIMINATES THE DRAG OF THE TYPE RACKS AND TYPE RACK OPERATING GEARS.

MACHINE NORMAL, STUD (F) IN TYPE RACK LOCK BAIL (1) IS HELD IN AN OVER-LATCHED POSITION WITH LATCH (9) BY ROLL (D) ON THE MAINSHAFT. EXTENSIONS (A) OF TYPE RACK LOCK BAIL (1) ARE OVER STUDS (B) OF TYPE RACKS (3).

AS THE MAINSHAFT OPERATES, ROLL (D) WILL RELEASE EXTENSION (C) OF THE TYPE RACK LOCK BAIL (1). AT THIS TIME, STUD (F) LATCHES WITH LATCH (9). STUD (E) WILL CONTACT TYPE RACK LOCK BAIL LATCH (9) UNLATCHING TYPE RACK LOCK BAIL (1) AND SPRING (7) WILL ROTATE THE BAIL CLOCKWISE OUT OF THE PATH OF THE TYPE RACKS (3). AS THE MAINSHAFT RESTORES, ROLL (D) WILL CONTACT EXTENSION (C) BRINGING THE TYPE RACK LOCK BAIL FINGERS (A) DOWN OVER THE STUDS (B) IN THE TYPE RACKS (3) AND OVER-LATCH STUD (F) WITH LATCH (9).

THE PURPOSE OF THE TYPE RACK LOCK BAIL LATCH (9) IS TO DELAY THE RELEASING OF BAIL (1) TO PERMIT THE ACCUMULATOR RACKS TO RE-MESH WITH THE TYPE RACK OPERATING GEARS WHEN COMING OUT OF CARRY POSITION.

THE TYPE RACKS (3) MAY BE REMOVED FROM THE MODEL 99 BY PLACING ALL RACKS IN CARRY POSITION, INSERTING A ONE AND ALL SPACES IN THE STOP SECTION AND TURNING THE MAINSHAFT FORWARD TO PERMIT THE TYPE RACKS (3) TO PASS THE LOCK BAIL. THE TYPE RACKS (3) MAY THEN BE LIFTED OUT OF THE MACHINE WITH THE EXCEPTION OF THE LAST TWO ON THE LEFT. TO REMOVE THESE, PUSH ACCUMULATOR RACKS FORWARD INTO CARRY POSITION. TO REMOVE CHARACTER RACK, IT IS NECESSARY TO LOOSEN REAR TYPE RACK GUIDE COMB.

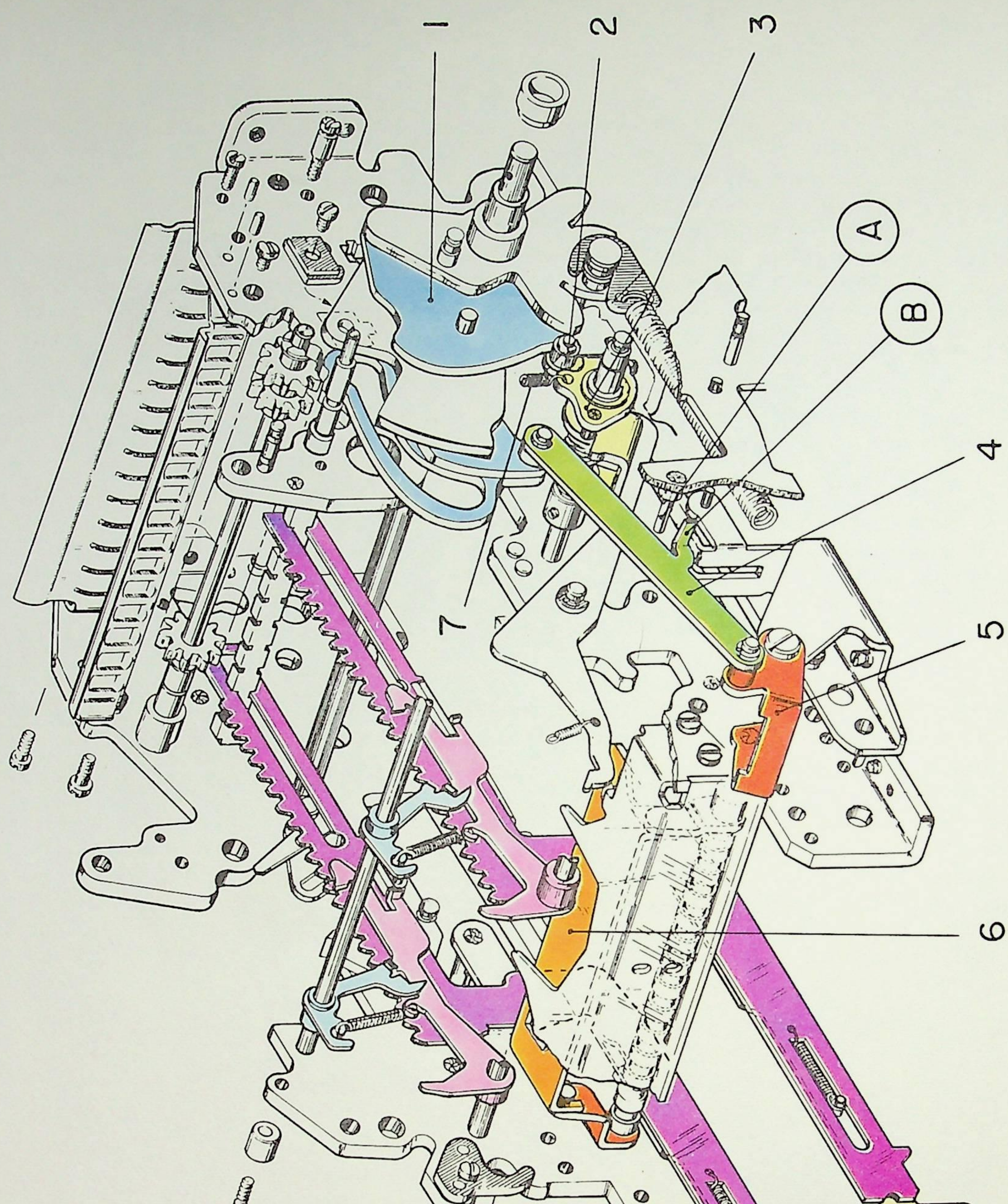


PLATE 15 POSTIVE RESTORING MECHANISM

POSITIVE RACK RESTORING MECHANISM

PLATE 15

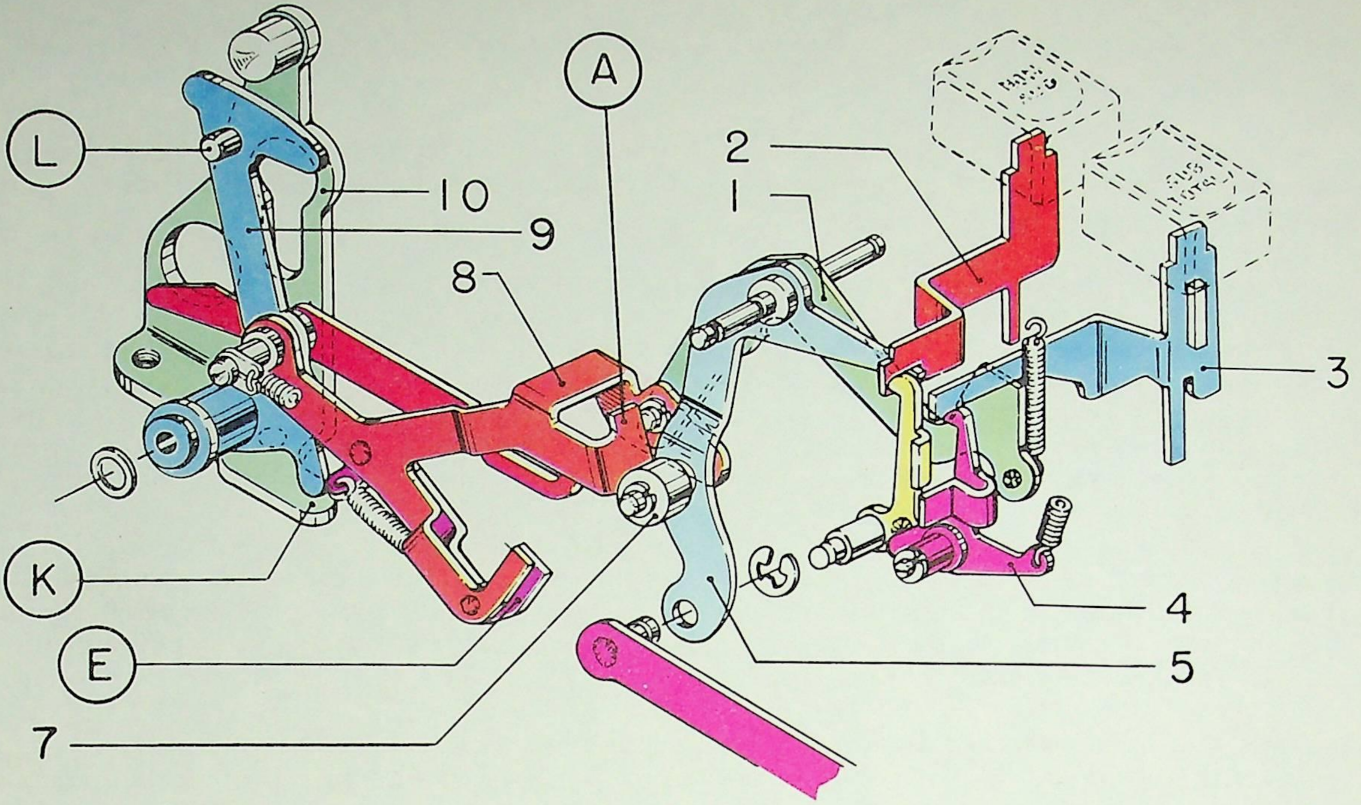
THE PURPOSE OF THE POSITIVE RACK RESTORING MECHANISM IS TO RESTORE THE ACCUMULATOR RACKS FROM CARRY POSITION WHEN THE ACCUMULATOR RACK HEELS ARE LIMITING AGAINST THE SPACE STOPS.

AS THE MAINSHAFT MOVES FORWARD, THE MAINSHAFT DRIVE PLATE (1) CONTACTS ROLL (2), ACTUATING RACK RESTORING ACTUATOR BELLCRANK (3). THIS, IN TURN, MOVES RACK RESTORING ACTUATOR LINK (4) TO THE REAR UNTIL LIP (B) LIMITS AGAINST STUD (A) IN THE SIDE FRAME. AS LINK (4) MOVES REARWARD, RACK RESTORING ACTUATOR ASSEMBLY (5) IS OPERATED, CAUSING RACK RESTORING PLATE (6) TO MOVE TO THE REAR AND CONTACT THE UPRIGHT PORTION OF THE ACCUMULATOR RACKS, PUSHING THEM TO THE REAR AND PERMITTING THE CARRY PAWLS TO RESTORE. ON THE RETURN STROKE, ALL PARTS WILL BE RESTORED TO NORMAL THROUGH THE TENSION OF SPRING (7).

ALL MACHINES WITH POSITIVE RACK RESTORING MECHANISM HAVE HIGH SPEED MECHANISM. THIS MECHANISM INCLUDES RE-DESIGNED ACCUMULATOR RACKS, ACCUMULATOR RACK RESTORING SHAFT ASSEMBLY AND THE ADDITION OF A ROLLER ASSEMBLY BETWEEN THE CENTER FRAMES TO CAM THE ACCUMULATOR RACK SLIDES OFF THE SCATTER LUGS.

ALL MACHINES WITH POSITIVE RACK RESTORING MECHANISM ALSO HAVE .015 GROUND OFF THE FACE OF THE CIPHER STOPS. THIS IS NECESSARY TO OBTAIN LUG CLEARANCE SINCE THE ACCUMULATOR RACK SLIDES DO NOT ENGAGE WITH THE SCATTER LUGS WHEN IN ZERO POSITION.

ON MACHINES WITH HIGH SPEED MECHANISM, THE LOW SPEED IS 150 STROKES PER MINUTE AND HIGH SPEED IS 190 STROKES PER MINUTE.



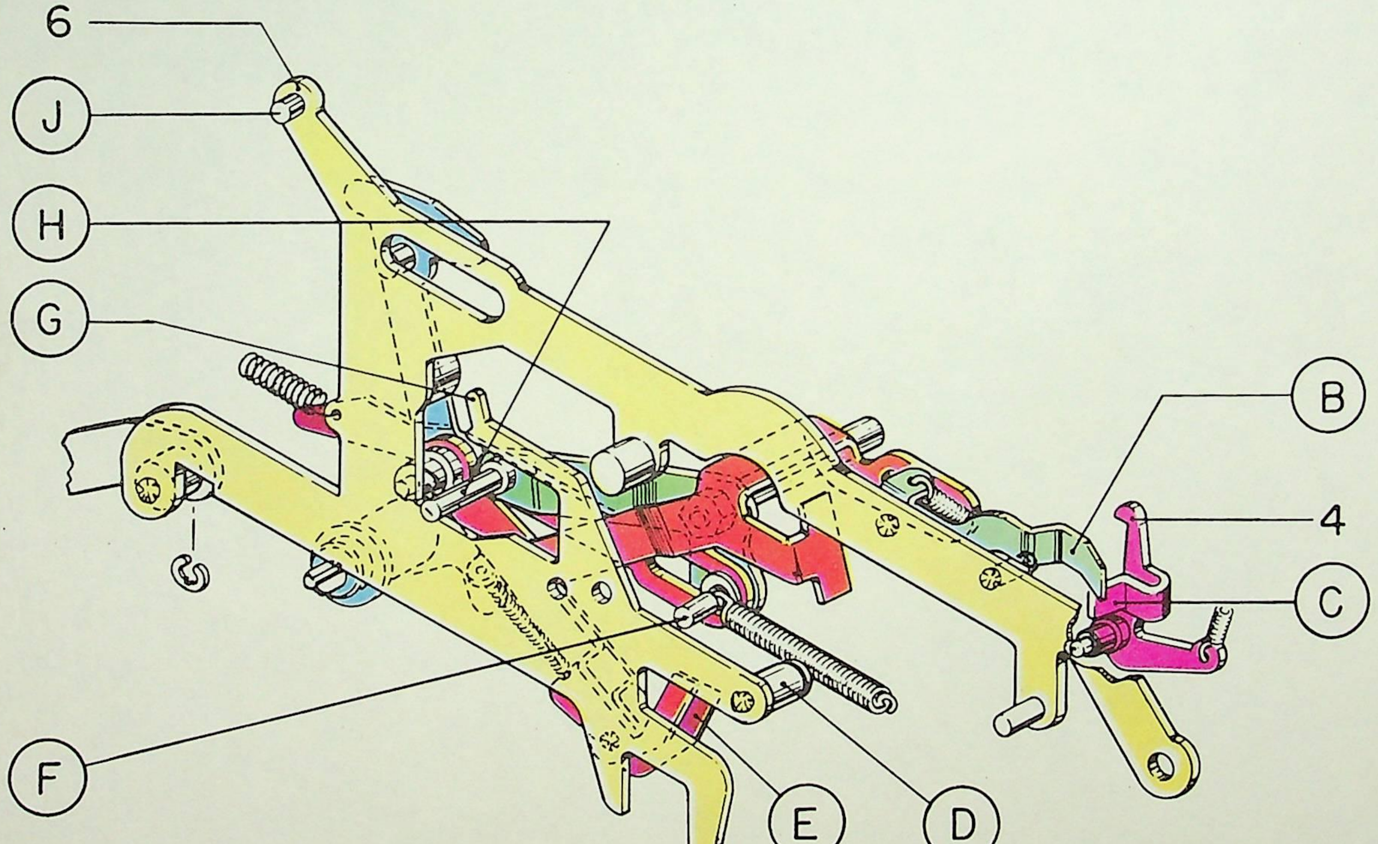


PLATE 16

NON-ADD and SUB-TOTAL

NON-ADD AND SUB-TOTAL MECHANISM

PLATE 16

THE SUB-TOTAL KEY MAY BE LATCHED DOWN AT ANY TIME. IF LATCHED DOWN DURING A MULTIPLICATION PROBLEM, THE MACHINE WILL TAKE AN AUTOMATIC BLANK STROKE AND SUB-TOTAL AT THE END OF A PROBLEM.

AS THE SUB-TOTAL KEY (3) IS DEPRESSED, SUB-TOTAL BELLCRANK (1) WILL RAISE NON-ADD AND SUB-TOTAL LINK (8), POSITIONING YIELDING PAWL (E) IN THE PATH OF ROLL (D) OF THE TOTAL SLIDE (6). AS THE TOTAL SLIDE (6) MOVES TO THE REAR, ROLL (D) WILL CONTACT YIELDING PAWL (E) AND POSITION THE NON-ADD CAM LOCK LEVER STUD (L) TO THE REAR OF THE TOTAL CAM. AT THE SAME TIME, REAR PORTION OF YIELDING PAWL (E) WILL CONTACT STUD (F) AND POSITION THE CHARACTER SELECTOR SHAFT FOR THE "S" SYMBOL TO PRINT. WHEN THE MACHINE IS NORMAL, PAWL (B) RESTS ON TOP OF LIP (C). AS THE TOTAL SLIDE (6) MOVES REARWARD, PAWL (B) DROPS IN BACK OF LIP (C) OF SUB-TOTAL KEY LATCH (4). AS TOTAL SLIDE (6) RESTORES, PAWL (B) WILL PUSH LIP (C) FORWARD AND UNLATCH SUB-TOTAL KEY (3).

DEPRESSING THE NON-ADD KEY (2) ROTATES NON-ADD BELLCRANK (5). ROLL (7) CONTACTS LIP (A) OF NON-ADD AND SUB-TOTAL LINK ASSEMBLY (8) AND, IN TURN, POSITIONS NON-ADD CAM LOCK LEVER ASSEMBLY (9) TO THE REAR OF THE TOTAL CAM, AT THE SAME TIME POSITIONING THE CHARACTER SELECTOR SHAFT FOR THE "V" SYMBOL TO PRINT.

ON MACHINES WITH LATCH-DOWN SUB-TOTAL MECHANISM, THE INSIDE FLANGE OF THE TOTAL CAM IS SHORTER TO PERMIT THE NON-ADD CAM LOCK LEVER ASSEMBLY (9) TO BE POSITIONED LATER AS IS THE CASE WHEN BEING DRIVEN TO THE REAR BY THE TOTAL SLIDE.

THE PURPOSE OF EXTENSION (G) ON THE TOTAL SLIDE (6) IS TO BLOCK STUD (H) ON LEFT CHARACTER SHAFT ARM TO PREVENT CHARACTER STOP FROM OVERTHROWING ON SUB-TOTAL OPERATION.

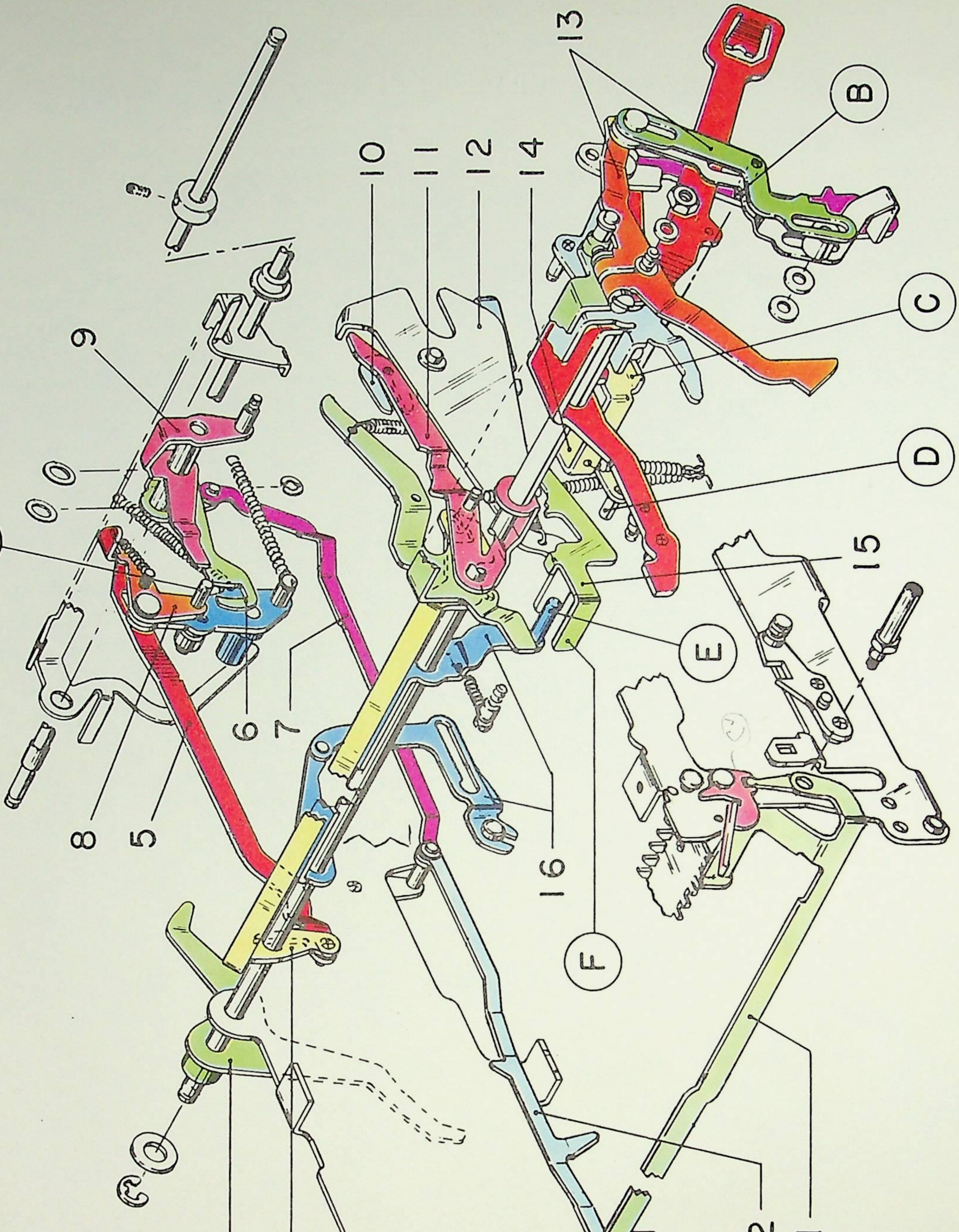


PLATE 17 CREDIT BALANCE

CREDIT BALANCE OPERATION

POSITIVE TO NEGATIVE OPERATION

PLATES 17 AND 18

MACHINE NORMAL, ENTER ITEM IN STOP SECTION AND DEPRESS THE SUBTRACT KEY. AS THE ITEM IS ENTERED INTO THE STOP SECTION, THE BLANK STROKE LOCK BELLCRANK (1) PLATE 17, WILL ROTATE, PULLING LINKS (2) AND (7) TO THE FRONT OF MACHINE. THIS WILL POSITION THE NEGATIVE TOTAL BLOCK ARM (OUTER) (6) TO BLOCK STUD (A) IN THE NEGATIVE TOTAL LINK OPERATING ARM PAWL (8) WHICH IS THE SAME AS WAS USED ON PREVIOUS MACHINES.

AS THE MAINSHAFT MOVES FORWARD, THE SUBTRACT SLIDE (12) PLATE 18, WILL MOVE TO THE REAR. EXTENSION (F) OF THE SUBTRACT SLIDE PIVOT PAWL (15) WILL CONTACT STUD (E) OF THE CREDIT BALANCE BELLCRANK PAWL LIFT ARM (16). THE LEFT EXTENSION OF LIFT ARM (16) WILL RAISE THE BELLCRANK PAWL (N), POSITIONING ITS UPPER EXTENSION (H) BEYOND THE UPPER STUD (G) OF THE CREDIT BALANCE OPERATING BELLCRANK (17). WHEN A COMPLETE CARRY-OVER OCCURS AND THE CREDIT BALANCE AND MOTOR CONTROL SLIDE (18) MOVES TO THE FRONT OF MACHINE INTO CARRY POSITION, IT WILL CAUSE BELLCRANK PAWL (N), FASTENED TO IT, TO ROTATE THE CREDIT BALANCE OPERATING BELLCRANK (17) COUNTER-CLOCKWISE. THIS, IN TURN, WILL ROTATE THE CREDIT BALANCE CARRY PAWL CAM ASSEMBLY (19) TO THE REAR, CAUSING ITS RIGHT ARM (K) TO CAM DOWN THE FIRST CARRY PAWL (25) TO ACCUMULATE THE "AUTOMATIC ONE". AT THE SAME TIME CAM ASSEMBLY (19) ROTATES, THE NEGATIVE TOTAL BLOCK ARM LINK (20), CONNECTED TO IT, WILL MOVE TO THE FRONT OF THE MACHINE. THIS WILL CAUSE THE NEGATIVE TOTAL BLOCK ARM (INNER) (9) PLATE 17, TO MOVE UP OUT OF THE PATH OF THE STUD (A) ON THE NEGATIVE TOTAL LINK OPERATING ARM PAWL (8).

AS THE STOP SECTION RESTORES, THE BLANK STROKE LOCK BELLCRANK (1) WILL CAUSE LINKS (2) AND (7) TO MOVE TO THE REAR, LOWERING THE NEGATIVE TOTAL BLOCK ARM (OUTER) (6) OUT OF THE PATH OF STUD (A) ON THE NEGATIVE TOTAL LINK OPERATING ARM PAWL (8). THE MACHINE IS NOW IN A NEGATIVE POSITION, INDICATING MORE HAS BEEN SUBTRACTED FROM THE MACHINE THAN WAS ADDED.

NEGATIVE TO POSITIVE OPERATION

TO BRING THE MACHINE BACK TO A POSITIVE POSITION, IT WILL BE NECESSARY TO ADD A LARGER ITEM THAN WAS SUBTRACTED.

AS THIS LARGER ITEM IS ENTERED IN THE STOP SECTION, THE BLANK STROKE LOCK BELLCRANK (1) PLATE 17, WILL AGAIN ROTATE, CAUSING LINKS (2) AND (7) TO MOVE TO THE FRONT, POSITIONING THE NEGATIVE TOTAL BLOCK ARM (OUTER) (6) IN THE PATH OF THE STUD (A) ON THE NEGATIVE TOTAL LINK OPERATING ARM PAWL (8). THIS WILL PREVENT THE PAWL FROM OPERATING THE SUBTRACT MECHANISM AND PERMIT THE ACCUMULATOR WHEELS TO REVOLVE BACK TO ADD POSITION. WHEN THE SUBTRACT SLIDE (12) MOVES FORWARD, EXTENSION (L) PLATE 18, OF THE SLIDE WILL CONTACT STUD (E) MOVING IT TO THE FRONT AND CAUSING THE CREDIT BALANCE BELLCRANK PAWL LIFT ARM (16) TO LOWER THE BELLCRANK PAWL (N) SO THAT ITS LOWER EXTENSION (J) WILL HOOK OVER STUD (M) OF THE CREDIT BALANCE BELLCRANK (17).

AS A COMPLETE CARRY-OVER OCCURS IN THE ADD WHEELS AND THE CREDIT BALANCE AND MOTOR CONTROL SLIDE (18) MOVES FORWARD INTO CARRY POSITION, THE CREDIT BALANCE BELLCRANK PAWL (N) WILL ROTATE THE CREDIT BALANCE OPERATING BELLCRANK (17) CLOCKWISE. THIS, IN TURN, WILL ROTATE THE CREDIT BALANCE CARRY PAWL CAM ASSEMBLY (19) TO THE FRONT OF MACHINE AND EXTENSION (K) WILL CAM DOWN THE FIRST CARRY PAWL (25), ACCUMULATING THE "AUTOMATIC ONE". AS CAM ASSEMBLY (19) ROTATES, IT WILL MOVE NEGATIVE TOTAL BLOCK ARM LINK (20) TO THE REAR. THIS WILL LOWER THE NEGATIVE TOTAL BLOCK ARM (INNER) (9) PLATE 17, INTO THE PATH OF THE STUD (A) ON THE NEGATIVE TOTAL LINK OPERATING ARM

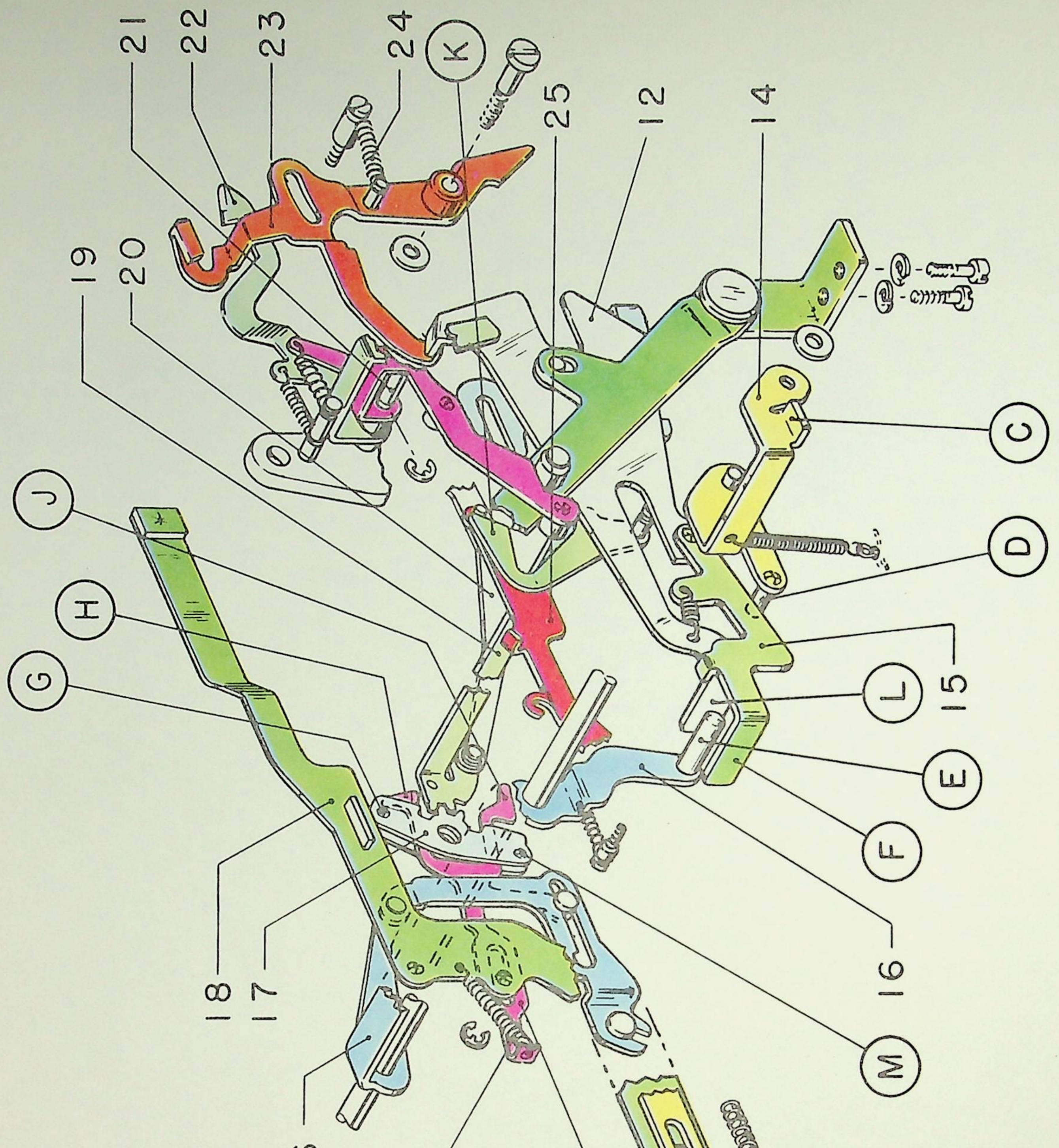


PLATE 18 CREDIT BALANCE

CREDIT BALANCE OPERATION

NEGATIVE TO POSITIVE OPERATION (CONT'D.)

PAWL ASSEMBLY (8).

WHEN THE STOP SECTION RESTORES, THE BLANK STROKE LOCK BELLCRANK (1) WILL PUSH LINKS (2) AND (7) TO THE REAR. THIS WILL LOWER THE NEGATIVE TOTAL BLOCK (OUTER) (6) OUT OF THE PATH OF THE STUD (A) ON THE NEGATIVE TOTAL LINK OPERATING ARM PAWL ASSEMBLY (8).

CREDIT BALANCE DISCONNECT

WHEN THE DIVISION KEY IS DEPRESSED AND THE DIVISION SHAFT (4) PLATE 17, ROTATES THE RIGHT DIVISION SHAFT ARM (13) COUNTER-CLOCKWISE, STUD (B) ON THE OUTER LINK OF THE RIGHT DIVISION SHAFT ARM (13) WILL CONTACT LIP (C) OF THE DIVISION SUBTRACT SLIDE PAWL RAISING BELLCRANK (14), CAUSING IT TO MOVE UP. STUD (D) OF BELLCRANK (14) WILL CONTACT THE SUBTRACT SLIDE PAWL (15) OF THE SUBTRACT SLIDE (12) RAISING EXTENSION (F) OUT OF THE PATH OF STUD (E) OF THE CREDIT BALANCE BELLCRANK PAWL LIFT ARM (16). THEREFORE, DURING DIVISION OPERATIONS, THE CREDIT BALANCE MECHANISM WILL BE INOPERATIVE.

THE PURPOSE OF YIELD SPRING (27) PLATE 18, ON THE CREDIT BALANCE BELLCRANK PAWL (N) IS TO PERMIT THE CREDIT BALANCE AND MOTOR CONTROL SLIDE (18) TO MOVE TO THE REAR UNDER THE M & Q RACK DURING AN ERROR OPERATION IN DIVISION. SPRING (26) OF THE CREDIT BALANCE AND MOTOR CONTROL SLIDE (18) WILL CAUSE SPRING (27) TO YIELD WHEN THE CREDIT BALANCE BELLCRANK PAWL (N) LIMITS AGAINST THE CREDIT BALANCE OPERATING BELLCRANK (17) PIVOT STUD. SLIDE (18) WILL MOVE ON TO THE REAR UNDER THE M & Q RACK, CAMMING ITS OWN CARRY PAWL DOWN AND RESTORING THE DIVISION KEY. THE MACHINE WILL THEN PROCEED TO CLEAR OUT IN THE USUAL MANNER AND STOP.

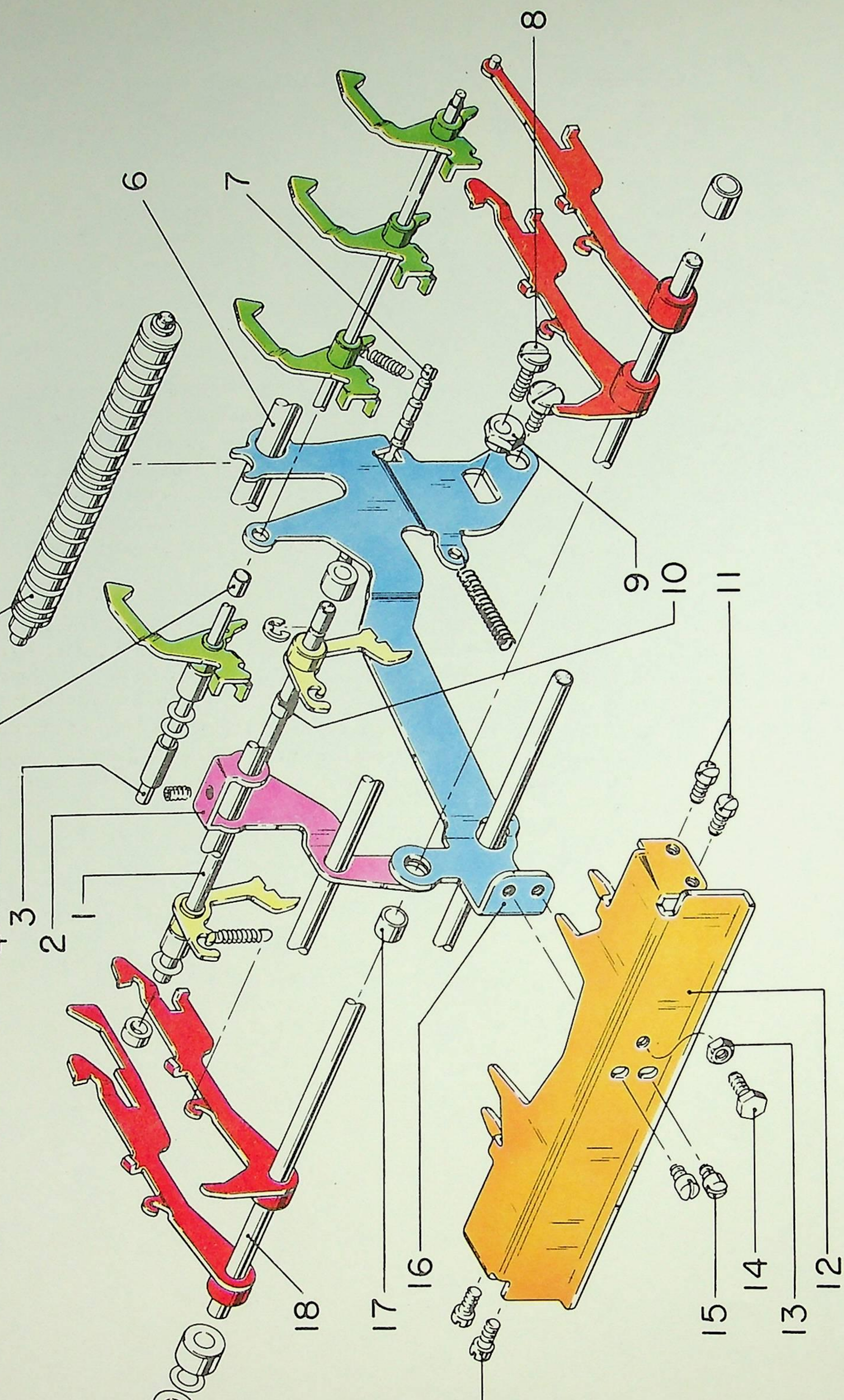


PLATE 19 CENTER SUPPORT

X

MODEL 99 PRINTING CALCULATOR

CENTER SUPPORT

PLATE 19

DUE TO THE LARGE CAPACITY OF THE MODEL 99 CALCULATOR, A SUPPORT PLATE (16) HAS BEEN ADDED BETWEEN THE TWO CENTER FRAMES. IT CAN BE NOTED THAT SUPPORT PLATE (16) IS ANCHORED AT THE REAR WITH SCREWS (8) AND AT THE FRONT WITH SCREWS (15). THIS SUPPORT PLATE (16) SUPPORTS THE ACCUMULATOR RACK SPRING SHAFT (7), HAMMER PIVOT SHAFT (5), HAMMER LATCH SHAFT (3), CARRY PAWL LATCH SHAFT (1) AND CARRY PAWL SHAFT (18).

TO ADJUST SUPPORT PLATE (16), PLACE CARRY PAWL SHAFT (18) AND BUSHING (17) IN MACHINE WITHOUT CARRY PAWLS AND SHAFT (1) AND BUSHING (10) WITHOUT LATCHES. LOOSEN SCREWS (8), (15) AND (11). MOVE PLATES (16) OR (12) UP OR DOWN UNTIL SHAFT (18) FLOATS PERFECTLY FREE IN BUSHING (17) WITH BUSHING (17) PLACED IN SUPPORTS (16) AND (2). TIGHTEN SCREWS (15) AND (11). CHECK POSITIVE RACK RESTORING PLATE (6) PLATE 15, FOR FREE. TO CHECK HAMMER LATCH SHAFT (3) FOR FREE IN BUSHING (4), TURN ECCENTRIC (9) UNTIL HAMMER RESTORING ARM SHAFT (6) IS PERFECTLY FREE AND TIGHTEN SCREWS (8). RE-CHECK CARRY PAWL SHAFT (18) FOR BEING PERFECTLY FREE AFTER ALL SCREWS ARE TIGHT.

AFTER STOP SECTION HAS BEEN PLACED IN MACHINE, LOOSEN LOCK NUT (13) AND ADJUST SCREW (14) TO JUST CLEAR THE REAR STOP SECTION RAIL. RE-TIGHTEN LOCK NUT (13).

FIRST
TEST

INSPECTIONS
and
ADJUSTMENTS

Model 99

MULTIPLY KEYS 2 THRU 9

PLATES 1, 2 AND 3

1. MULTIPLY NON-PRINT BELLCRANK LATCH ACTUATOR (21) AND MOTOR DRIVE CONTROL BELLCRANK (12) TO LIMIT ON FORWARD EXTENSIONS OF MULTIPLY FRAME AND CLEAR THE EXTENSIONS OF COMB (13) BY .010 WITH THE MACHINE NORMAL. CHECK CLEARANCE BY REMOVING PLAY IN COMB (13).

   ADJ: FORM THE EXTENSIONS OF THE BELLCRANKS (12) OR (21) OVER COMB (13).

2. A. MULTIPLY KEY LATCHED, MAINSHAFT FORWARD, CONTROL CONNECTOR LINK EXTENSION (A) TO LEAD THE LATCHING SURFACE OF LATCH (17) BY .020-.030.

   ADJ: FORM MOTOR DRIVE CONTROL BELLCRANK (12) WITH TWO T-BENDERS BELOW ITS PIVOT STUD.

   B. AT THE TIME ROLL (G) ON LINK (10) RELEASES CONTROL ARM (C) FROM ROLL (D), THE KEYSTEM LOCK BAIL (16) SHOULD CLEAR OVER EXTENSION (N) OF THE MULTIPLY KEY BY .020-.030 AND THE MULTIPLY KEY SHOULD HAVE FURTHER DOWNWARD MOVEMENT.

   ADJ: RECHECK INSPECTIONS 1 AND 2A. CHANGE ROLL (G).

3. AS THE MULTIPLY KEY IS DEPRESSED, EXTENSION (N) SHOULD CLEAR THE LOWER REAR EDGE OF THE KEYSTEM LOCK BAIL (16) BY .030 TO .060.

   ADJ: CHANGE ROLL (D) OR FORM RIGHT END OF LOCK BAIL (16) TO TIP STUD (K).

4. MACHINE NORMAL, PAWL (B) OF LATCH ASSEMBLY (5) MUST CLEAR BACK OF ROLL (J) BY .020 AS A MULTIPLY KEY IS DEPRESSED AND WITH MULTIPLY KEY LATCHED, ROLL (J) MUST DRIVE PAWL (B) FAR ENOUGH FOR LATCH (5) TO CLEAR ARM (3) BY .060. PAWL (B) MUST NOT BE DRIVEN TO A LIMIT.

   ADJ: CHANGE ROLL (J).

5. MULTIPLY KEY 2 THRU 9 DEPRESSED, MULTIPLY MECHANISM OPERATING SLIDE (28), PLATE 2, SHOULD BE POSITIONED TO A REARWARD LIMIT AGAINST STUD (27) IN BASE.

   ADJ: CHECK ALL PARTS FOR FREE AND SPRING (29) FOR PROPER TENSION.

6. ON THE FIRST RETURN STROKE WITH NUMBER 3 MULTIPLY KEY DEPRESSED, SEE THAT STUD (X) HOLDS EXTENSION (V) OF NON-PRINT RESTORING ARM PAWL (24) LOW ENOUGH TO PREVENT STEP (W) FROM RELATCHING ROLL (T).

   ADJ: RECHECK INSPECTION 1. FORM NON-PRINT BELLCRANK LATCH ACTUATOR (21) BELOW ITS PIVOT STUD.

7. ON NEXT TO THE LAST FORWARD STROKE, STEP (W) OF RESTORING ARM PAWL (24) SHOULD OVERLATCH ROLL (T) BY .060.

   ADJ: CHECK MAINSHAFT FOR MOVING ALL THE WAY FORWARD; ALSO, LEFT ARM OF UNIVERSAL DRIVE SHAFT FOR BEING TWISTED. CHECK SPRING (25) FOR PROPER TENSION.

MULTIPLY KEYS 2 THRU 9

PLATES 1, 2, AND 3

8. MACHINE NORMAL, OPERATING SLIDE RETAINING PAWL (35), PLATE 3, TO JUST CLEAR STUD IN MULT FRAME. WITH A MULTIPLY KEY DEPRESSED, PAWL (35) SHOULD BE FULLY ENGAGED IN THE TEETH OF SLIDE (15).

ADJ: FORM EXTENSION OF BELLCRANK (39) WHERE IT CONTACTS STUD (Z).

9. A. BOTTOM TOOTH OF GEAR ON SHAFT (33) SHOULD BE BELOW BOTTOM TOOTH OF GEAR ON SHAFT (7). GEARS SHOULD MESH WITH .003 TO .008 CLEARANCE.

ADJ: LOOSEN SET COLLAR ON LEFT END OF SHAFT (7) AND MOVE SHAFT TO RIGHT OR LEFT.

B. MULTIPLY KEY DEPRESSED AND MAINSHAFT ALL THE WAY FORWARD, OPERATING SLIDE PAWL (34) MUST PULL OPERATING SLIDE (15) ONE SPACE AND OVERLATCH WITH PAWL (35) BY .030. TO .040.

ADJ: REPOSITION ARM (32) ON SHAFT (33).

10. MULTIPLY KEY LATCHED, LIMIT SCREW (16A), PLATE 1, TO HOLD KEYSTEM LOCK BAIL (16) CLEAR OF EXTENSIONS (N) BY NO MORE THAN .005.

ADJ: REPOSITION LIMIT SCREW (16A) BY LOOSENING LOCK NUT.

KEY RESTORING MECHANISM

PLATE 4

1. A. MACHINE NORMAL, OPERATING PAWL (1), PLATE 4, TO CLEAR STUD (E) OF RETURN ARM (12) BY .020 WITHOUT UPLIMITING. ITEM IN THE STOP SECTION, PAWL (1) TO DROP OVER STUD (E) WITH A SAFE HOLD.

ADJ: CHECK BLANK STROKE LOCK BELLCRANK (7) FOR .005 CLEARANCE. FORM ARM (C).

B. ONE AND SPACES IN STOP SECTION, #1 MULTIPLY KEY DEPRESSED, TURN MAINSHAFT THROUGH UNTIL HIGH POINT OF MOTOR DRIVE CRANK CONTACTS MOTOR DRIVE CONTACT ARM. AT THIS TIME, SLIDE (13) SHOULD JUST UPLIMIT IN ITS RACEWAY AND FEATURE KEY SHAFT ASSEMBLY (4) SHOULD HAVE .010 MOVEMENT.

ADJ: ADJUST LOWER MARCEL LINK (3). ~~FORM OFF-SET IN LINK (2).~~

SHORT CUT MULTIPLICATION

PLATES 5 AND 5A

1. A. SHORT CUT KEY FULLY DEPRESSED, SPACE KEY EXTENSION (3) SHOULD HAVE .001 TO .005 FURTHER DOWNWARD MOVEMENT. CHECK ON EACH MULTIPLY KEY 6 THRU 9.

ADJ: CHECK EAR (B) ON SPACE KEY DRIVE BAIL (4) FOR STRAIGHT. CHECK MOUNTING STUD FOR SPACE KEY DRIVE PAWL (5) FOR STRAIGHT. FORM EXTENSIONS (F) ON BAIL (6).

22 pos
13 pos
8 pos
4th trip motor

SHORT CUT MULTIPLICATION

PLATES 5 AND 5A

1 2 B. AS SHORT CUT KEY IS DEPRESSED, SPACE KEY EXTENSION (3) SHOULD BE APPROXIMATELY 3/4 OF THE WAY DOWN AND THEN LATCH (7) SHOULD RELEASE SLIDE (8).

ADJ: FORM RIGHT END OF LATCH (7).

C. [illegible] AS SHORT CUT KEY IS DEPRESSED, STEP (W) OF NON-PRINT BELLCRANK RESTORING ARM PAWL (24), PLATE 2, SHOULD RELEASE FROM ROLL (T) ON NON-PRINT RESTORING ARM (23) FIRST, LATCH (14), PLATE 5, SHOULD RELEASE PAWL (13) SECOND, LATCH (7) SHOULD RELEASE SLIDE (8) THIRD, AND FINALLY MOTOR SHOULD BE TRIPPED.

ADJ: RECHECK ADJUSTMENTS (1) AND (6), PLATE 1, FOR RELEASING PAWL (24) FROM ROLL (T). RECHECK ADJUSTMENT 1B PLATE 5. FORM LIP (N) TO PERMIT LATCH (14) RELEASING PAWL (13). RECHECK ADJUSTMENTS 1, 2A AND 2B, PLATE 1, FOR MOTOR TRIP.

2. A. ON THE FIRST FORWARD STROKE, STUD (M) MUST CAM PAWL (L) OFF LIP (N) TO PERMIT LATCH (14) TO RESTORE.

ADJ: CHECK STUD (M) FOR PARALLEL WITH UNIVERSAL DRIVE SHAFT. FORM LIP (N) TO REAR.

B. ALSO ON FORWARD STROKE, STUD (E) MUST CONTACT EXTENSION (D) AND CAM PAWL (5) OFF STUD (C) OF BAIL (4).

ADJ: FORM EXTENSION (D) SIDEWAYS.

3. MAINSHAFT ALL THE WAY FORWARD ON FIRST STROKE, OPERATING ARM LATCH (15) TO CLEAR LIP OF OPERATING ARM (16) BY .060.

ADJ: FORM EAR OF LATCH (15) WHERE IT LIMITS ON SUPPORT BRACKET ON KEYBOARD. IF ARM (16) IS NOT RAISED HIGH ENOUGH TO RELEASE LATCH (15), CHECK MAINSHAFT FOR SHORT STROKING OR CHANGE ROLL ON BACKSPACE CAM.

Deal 4. A. MACHINE NORMAL, ARM (16) LATCHED WITH LATCH (15), UPPER EXTENSION OF ARM (16) TO CLEAR STUD IN LEFT ARM OF CATCH SHAFT (17), PLATE 5A, BY .030.

ADJ: FORM UPPER EXTENSION OF ARM (16) OR REPOSITION ARM ON LEFT END OF SHAFT (17).

B. MACHINE NORMAL, ARM (16) RELEASED, EXTENSION (S) TO OVERLATCH LATCH (20) BY .020.

ADJ: REPOSITION ARM (18) ON SHAFT (17).

when on high point of B.S. Cam,

5. BACKSPACE DRIVE ARM (11), PLATE 5, SHOULD BE ADJUSTED TO DRIVE SLIDE (8) TO THE RIGHT WITHIN .010 TO .020 OF A LIMIT.

ADJ: REPOSITION DRIVE ARM (11).

NCRG

SHORT CUT MULTIPLICATION

PLATES 5 AND 5A

6. ON THE SECOND STROKE, LATCH (15) MUST RELATCH ARM (16).

ADJ: CHECK ALL PARTS FOR FREE AND PROPER SPRING TENSION.

[illegible]

On high point of B.S. Cam

7. A. WITH THE BACKSPACE SHAFT ASSEMBLY (19), PLATE 5A, FULLY ACTUATED, ARM (T) TO RAISE LATCH (20) TO CLEAR EXTENSION (S) BY .020 TO .030 WITHOUT UPLIMITING.

ADJ: FORM ARM (T). edgways.

B. LATCH (20) SHOULD ALSO BE RAISED .020 TO .030 ABOVE EXTENSION (S) WHEN ACTUATED BY THE RESET GEARS WITHOUT UPLIMITING.

ADJ: CHECK ARM (25) FOR TIGHT ON RESET GEAR SHAFT (24). CHANGE ROLL (V).

AUTOMATIC BLANK STROKE AND TOTAL

PLATE 6

TEST / 1. Division Bail

1. A. SPACE STOP IN UNITS COLUMN, DIVISION LEVER DEPRESSED AND MAINSHAFT FORWARD, CHECK LEFT ARM OF DIVISION BAIL (4) TO BE AS CLOSE AS POSSIBLE TO LATCH (A) WITHOUT CONTACTING IT.

ADJ: FORM LEFT END OF DIVISION BAIL (4).

B. MACHINE IN SAME POSITION, THE ROLL ON THE LEFT END OF DIVISION BAIL (4) SHOULD NOT CONTACT THE DIVISION LEVER.

ADJ: CHANGE ROLL. USE AS LARGE A ROLL AS POSSIBLE.

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C. CIPHER STOP IN UNITS COLUMN, DIVISION LEVER DEPRESSED AND MAINSHAFT FORWARD, THE DIVISION LEVER SHOULD RESTORE AND LATCH (A) SHOULD MOVE TO THE FRONT OF LATCH (B) BY .050.

ADJ: CHECK DIVISION BAIL (4) FOR FREE AND PROPER SPRING TENSION. RECHECK ADJUSTMENTS 1A AND B.

D. MACHINE IN SAME POSITION, THERE SHOULD BE .010 CLEARANCE BETWEEN THE RIGHT EXTENSION OF THE DIVISION BAIL (4) AND THE EXTEND KEY EXTENSION, EXTEND KEY NORMAL.

ADJ: FORM RIGHT EXTENSION OF THE DIVISION BAIL (4).

2. A. SPACE STOP IN UNITS COLUMN, MAINSHAFT FORWARD, THERE SHOULD BE .010 CLEARANCE BETWEEN RIGHT EXTENSION OF DIVISION BAIL (4) AND EXTENSION ON BAIL (5).

ADJ: FORM BAIL (5).

0

B. CIPHER STOP IN UNITS COLUMN, MAINSHAFT FORWARD, BAIL (5) SHOULD UNLATCH LATCH (7) AND CLEAR BY .030.

ADJ: RECHECK ADJUSTMENT 2A.

AUTOMATIC BLANK STROKE AND TOTAL

PLATE 6

3. ITEM IN STOP SECTION, LATCH (A) LATCHED WITH LATCH (B), THERE SHOULD BE .030 CLEARANCE BETWEEN BAIL (5) AND LATCH (7).

   ADJ: FORM LINK (6).

4. NINE MULTIPLY KEY DEPRESSED, ON THE SIGNIFICANT FIGURE FORWARD STROKE, LIP (E) SHOULD BE DRIVEN .040 BEYOND LATCHING POSITION OF LATCH (7).

   ADJ: CHECK MAINSHAFT AND UNIVERSAL DRIVE SHAFT FOR MOVING ALL THE WAY FORWARD. ALSO, STUD ON LEFT END OF UNIVERSAL SHAFT SHOULD BE PARALLEL WITH THE SHAFT. CHECK PINS IN UNIVERSAL SHAFT AND BACKSPACE CAM FOR TIGHT.

5. MAINSHAFT ALL THE WAY FORWARD ON TOTAL OPERATION, LINK (F) SHOULD RAISE LATCH (7) HIGH ENOUGH TO RELEASE LIP (E) AND ALSO RELATCH WITH BAIL (5).

   ADJ: FORM LINK (F).

6. MACHINE NORMAL, EXTENSION (C) TO BE IN BLOCKING POSITION OF EXTENSION (D). MULTIPLY KEY DEPRESSED, EXTENSION (C) TO CLEAR EXTENSION (D).

   ADJ: FORM EXTENSION (C) OR (D).

7. DECIMAL KEY LATCHED, REPEAT SHAFT ARM OPERATING LINK (13) TO HOLD PLUNGER HIGH ENOUGH TO PREVENT STOP SECTION FROM CLEARING OUT. MACHINE NORMAL, REPEAT SHAFT ARM AND PLUNGER TO BE FULLY RESTORED.

   ADJ: SHORTEN OR LENGTHEN LINK (13).

NON-PRINT MECHANISM

PLATE 7

1. MACHINE NORMAL, THERE SHOULD BE .020 CLEARANCE BETWEEN STEP (R) OF BELLCRANK LATCH (19), PLATE 2, AND ROLL (G), PLATE 7, OF MULTIPLY NON-PRINT BELLCRANK (12).

   ADJ: CHECK MAINSHAFT FOR FULLY RESTORING AND LEFT ARM OF UNIVERSAL DRIVE SHAFT (17) FOR BEING TWISTED. CHANGE PAWL (15) OR ROLL (G).

   What if not large enough

2. MACHINE NORMAL, NON-PRINT LINKAGE (1) TO LIMIT ON STUD IN LEFT SIDE FRAME AND REAR END OF SLIDE (18) TO CLEAR INNER ROLL (J) ON NON-PRINT LINK BELLCRANK (2) BY .020.

   ADJ: CHANGE INNER ROLL (J) ON NON-PRINT LINK BELLCRANK (2). OPERATE MACHINE WITH MOTOR BAR AND SEE THAT SLIDE (18) DOES NOT CONTACT ROLL (J). IF SLIDE (18) DOES CONTACT ROLL (J), IT WILL BE NECESSARY TO RECHECK INSPECTIONS 1 AND 2.

3. A. ZERO OR ONE MULTIPLY KEY LATCHED, ARM (6) ON SHAFT (7) TO JUST CONTACT LIP (A) OF SLIDE (18).

   ADJ: LOOSEN TWO ALLEN SCREWS IN ARM (11), RAISE ARM (6) TO PROPER POSITION AND TIGHTEN SCREWS.

NON-PRINT MECHANISM

PLATE 7

B. MACHINE IN SAME POSITION, ARM (D) ON SHAFT (7) TO JUST CONTACT STUD (B) OF LATCH (9).

ADJ: REPOSITION ARM (D).

4. ZERO MULTIPLY KEY DEPRESSED, THE NON-ADD MECHANISM MUST BE POSITIONED TO REAR OF TOTAL LOCK CAM.

ADJ: FORM BELLCRANK (10) TO BRING STUD (E) UPWARD.

M & Q RACK

PLATES 8 & 8A

1. A. MACHINE NORMAL, EXTENSION (12A) OF LINK (12) TO CLEAR TOP OF LIMIT ARM (11) BY .030.

ADJ: CHECK MAINSHAFT FOR FULLY RESTORING, BACKSPACE CAM (1) FOR TIGHT. ROLL (B) ON BACKSPACE CAM MAY BE CHANGED OR REAR PORTION OF LINK (12) MAY BE FORMED.

B. MACHINE NORMAL, TOP OF LIMIT ARM (11) TO BE IN SAFE BLOCKING POSITION FOR (12A). MULTIPLY KEY DEPRESSED, (11A) MUST BE IN BLOCKING POSITION OF (12A).

ADJ: CHANGE ROLL (10) OR FORM ARM (11) TO TIP STUD.

2. MACHINE NORMAL, LATCH (2) TO CLEAR LATCHING POINT OF (3A) BY .030 TO .040. MAINSHAFT ALL THE WAY FORWARD, LOCK HOOK (16) SHOULD UNLATCH RETAINING PAWL (5) BY .060.

ADJ: FORM EXTENSION (K) OF LOCK HOOK (16). CHECK MAINSHAFT FOR MOVING ALL THE WAY FORWARD FOR THE .060 CLEARANCE.

3. MACHINE NORMAL, ARM (20) ON SHAFT (3), PLATE 8A, TO BE RESTING IN DWELL OF PLUNGER BAIL (21) AND AS CLOSE TO THE CAMMING SURFACE AS POSSIBLE.

ADJ: CHANGE POSITION OF ARM (20) ON SHAFT (3). IT MAY BE NECESSARY TO CHANGE ROLL ON ARM (20) TO RAISE PLUNGER (22) HIGHER.

4. MACHINE NORMAL, AUXILIARY LATCH (15) PLATE 8, TO BE HELD IN AN UNLATCHED POSITION BY RETAINING ARM (13) AND EXTENSION (P) TO HAVE A FULL HOLD BEYOND THE LATCHING POINT OF LATCH (15).

ADJ: FORM EXTENSION (15A) TO HOLD LATCH (15) UNLATCHED AND FORM OFFSET IN LATCH (15) FOR FULL HOLD BEYOND LATCHING POINT.

5. ROLL (L) RESTING AGAINST (14A), (4A) MUST BE IN SAFE BLOCKING POSITION OF EXTENSION (C). ROLL (L) RESTING AGAINST (14B), (4B) MUST BE IN SAFE BLOCKING POSITION OF EXTENSION (C).

ADJ: CHANGE ROLL (L) OR FORM LEFT ARM OF LIMIT LATCH (4) TO TIP STUD.

M & Q RACK

PLATES 8 & 8A

IMPORTANT

6. A. ANY MULTIPLY KEY 1 THRU 5 DEPRESSED, MAINSHAFT ALL THE WAY FORWARD, THE RIGHT EXTENSION OF RETAINING PAWL (5) SHOULD LIMIT IN THE DEEP PART OF TOOTH OF THE M & Q RACK AND CLEAR THE HIGH PORTION OF TOOTH BY .010 WHEN MOVING IN TO LATCH POSITION.

ADJ: CHECK ADJUSTMENT OF RIGHT EXTENSION OF PAWL (5) FOR PRINTING ALIGNMENT. FORM ARM (3A) TO TIP STUD (F) FOR MORE OR LESS DRIVE OF M & Q RACK.

must have the clearance so that lower cut M would not move far enough to allow it to kick 4A or B clear out of a blocking position

B. MACHINE IN SAME POSITION, LIMIT LATCH (4) TO OVERLATCH AUXILIARY RETAINING LATCH (15) BY .030.

ADJ: FORM EXTENSION (N).

IMPORTANT

7. ANY MULTIPLY KEY 1 THRU 5 DEPRESSED, MAINSHAFT FORWARD UNTIL (12A) RESTS ON (11A) THERE SHOULD BE .010 CLEARANCE BETWEEN (4A) AND EXTENSION (C).

ADJ: FORM OFFSET IN LIMIT LATCH (4).

To insure getting 4A out of C at the end of fwd stroke

8. SHORT CUT KEY DEPRESSED, PAWL (24), PLATE 8A, TO DROP IN PATH OF STUD (T) AND CLEAR STUD BY .030. MAX.

ADJ: FORM OFFSET IN LINK (28).

9. A. SHORT CUT KEY DEPRESSED, TURN MAINSHAFT FORWARD SLOWLY. EXTENSION (28A) OF SLIDE (28) MUST LIMIT AGAINST STUD (29) BEFORE SPRING (26) YIELDS.

ADJ: CHECK SLIDE (28) FOR FREE AND SPRING (26) FOR PROPER TENSION.

B. MACHINE IN SAME POSITION, OUTER PAWL (36) SHOULD CLEAR THE BACKSPACER BY .060.

ADJ: FORM EXTENSION (36A) OF OUTER PAWL (36).

MACHINE NORMAL

C. SHORT CUT KEY DEPRESSED, TURN MAINSHAFT FORWARD SLOWLY UNTIL EXTENSION (12A), PLATE 8, IS LEVEL WITH STEP (11A) AT THIS TIME, EXTENSION (12A) SHOULD CLEAR (11A) BY .080. (HORIZONTAL CLEARANCE)

ADJ: RECHECK ADJUSTMENT 9A. 4 8

D. MACHINE IN SAME POSITION, EXTENSION (11B) SHOULD ROTATE ARM (14) TO POSITION ROLL (L) TO (14B) POSITION FOR EXTENSION (4A) TO CLEAR EXTENSION (C) BY .030 AS THE M & Q RACK MOVES UP. EXTENSION (28A) LIMITING AGAINST STUD (29) ARM (14) SHOULD NOT LIMIT ON ROLL (L).

ADJ: RECHECK 8 & 9A ~~INSPECTION (5)~~. FORM THE FORWARD EXTENSION OF ARM (14).

10. SHORT CUT KEY DEPRESSED, MAINSHAFT ALL THE WAY FORWARD, LINK (12) MUST BE FREE TO TRAVEL TO ITS DOWN LIMIT.

ADJ: CHECK LINK (12) FOR BINDS.

Imp.

Short cut

M & Q RACK

PLATES 8 & 8A

11. A. SHORT CUT KEY DEPRESSED, MAINSHAFT ALL THE WAY FORWARD, THE RIGHT EXTENSION OF RETAINING PAWL (5) SHOULD LIMIT IN THE DEEP PART OF THE TOOTH OF THE M & Q RACK AND CLEAR THE HIGH PORTION OF THE TOOTH BY .010.

ADJ: CHANGE LIMIT ROLL (33), PLATE 8A, ON STUD IN BASE UNDER ARM (3A).

B. SHORT CUT KEY DEPRESSED, MAINSHAFT FORWARD UNTIL LINK (12), PLATE 8, DOWN LIMITS, THERE SHOULD BE .010 CLEARANCE BETWEEN (4B) AND EXTENSION (C).

ADJ: FORM OFFSET IN LIMIT LATCH (4). RECHECK INSPECTION 7.

12. ZERO MULTIPLY KEY DEPRESSED, EXTENSION (H) TO HAVE SAFE BLOCK UNDER (12A).

ADJ: FORM OFFSET IN LINK (31), PLATE 8A.

13. ZERO MULTIPLY KEY DEPRESSED, MAINSHAFT ALL THE WAY FORWARD, M & Q RACK MUST LOWER TO PRINT ZERO IN LINE WITH REST OF PRINTING.

ADJ: CHANGE ROLL (34). MACHINE NORMAL, ROLL (32) ON STUD UNDER SLIDE (31) TO JUST CLEAR THE SLIDE. USE AS LARGE A ROLL AS POSSIBLE.

14. + ZERO MULTIPLY KEY DEPRESSED, EXTENSION (J), PLATE 8, TO HOLD LONG PAWL CLEAR OF BACKSPACER BY .060.

ADJ: FORM LOWER EXTENSION OF LONG PAWL.

15. MACHINE NORMAL, RETURN PAWL (18), PLATE 8A, TO BE OVERLATCHED WITH LATCH (17) BY .040.

ADJ: CHECK MAINSHAFT FOR FULLY RESTORING. FORM LOWER EXTENSION (Y) OF PAWL (18) OR CHANGE ROLL (38) THAT EXTENSION CONTACTS.

16. NUMBER ONE MULTIPLY KEY DEPRESSED, MAINSHAFT ALL THE WAY FORWARD, RETURN PAWL (18) TO MOVE UNDER ROLL (A) ON SLIDE (12), PLATE 8, AND CLEAR IT BY AT LEAST .020.

ADJ: CHECK MAINSHAFT FOR MOVING ALL THE WAY FORWARD. FORM REAR PORTION OF LINK (12). RECHECK INSPECTION (1A).

M & Q RACK SNUBBER ARM
AND
M & Q FEED MECHANISM

PLATE 8B

1. MACHINE NORMAL, EXTENSION (C) TO BE CENTERED UNDER CAMMING SURFACE (B) OF SNUBBER ARM (5).

ADJ: FORM OFFSET IN SNUBBER ARM (5).

2. MACHINE NORMAL, EXTENSION (A) MUST LIMIT AGAINST COMB (1) AT THE SAME TIME EXTENSION (B) SHOULD JUST TOUCH EXTENSION (C).

ADJ: FORM BAIL PART OF SNUBBER ARM (5). BOTH SURFACES (B) AND (C) MUST BE SMOOTH.

M & Q RACK SNUBBER ARM

AND

M & Q FEED MECHANISM

PLATE 8B

3. WITH BOTH SCREWS (7) IN TYPE CARRIER OPERATING CAM (8) LOOSE, TURN MACHINE THROUGH UNTIL FIRING SCREW (10) IN SECOND HOLD OF MOTOR DRIVE CRANK (9) IS LEVEL WITH TOP OF BASE. TIGHTEN FORWARD ALLEN SCREW WITH ALLEN WRENCH POSITIONED STRAIGHT UP AND DOWN. TURN MAINSHAFT FORWARD AND TIGHTEN SECOND ALLEN SCREW.

MULT TOTAL KEY OPERATION

PLATES 9 & 9A

1. MACHINE NORMAL, MULT TOTAL KEYSTEM LATCH (7) TO CLEAR MULT TOTAL KEYSTEM EXTENSION (D) BY .060.

ADJ: CHECK BLANK STROKE LOCK BELLCRANK (11) FOR .005 CLEARANCE. IT MAY BE NECESSARY TO FORM EAR ON MULT TOTAL STEM LATCH (7).

2. MACHINE NORMAL, item in stop section. MULT TOTAL KEYSTEM PAWL (3) SHOULD BE FULLY POSITIONED OVER AND CLEAR STUD (B) BY APPROXIMATELY .020.

2A. STOP SECTION TO EXTREME LEFT, CHECK ZERO STOP PLATE FOR CLEARING MULT TOTAL KEYSTEM (1).

ADJ: CHECK MULT TOTAL KEY (1) FOR FULLY RESTORING. FORM EAR (E) ON SPACE-OVER BELLCRANK SHAFT ARM (4).

3. ITEM IN STOP SECTION, MULT TOTAL KEYSTEM LATCH (7) TO REST AGAINST EXTENSION (D).

ADJ: CHECK BLANK STROKE LOCK BELLCRANK (11) AND KEYSTEM LATCH (7) FOR FREE.

4. MULT TOTAL KEY (1) FULLY DEPRESSED, SPACE KEY EXTENSION (3), PLATE 5, SHOULD FULLY SET SPACE STOP, STOP SECTION SHOULD RELEASE, MULT TOTAL KEY (1) PLATE 9, TO LATCH AND THEN MOTOR CONTROL ARM LATCH (10) SHOULD RELEASE MOTOR CONTROL ARM (9).

ADJ: ~~CHECK NEGATIVE MULT TYPE DRIVE BAIL (6) AND STOP SECTION CONTROL SLIDE LATCH (7) PLATE 5, FOR BEING ADJUSTED CORRECTLY FOR SHORT CUT KEYS.~~ FORM EXTENSION (H) PLATE 9, OF SPACE-OVER SHAFT ARM (4) ~~TO CLEAR LEFT EXTENSION OF NEGATIVE MULT TYPE DRIVE BAIL (12) BY APPROXIMATELY .060, MACHINE NORMAL.~~ (IT MAY BE NECESSARY TO FORM EXTENSION (F) OF BAIL (12) FOR MOTOR TRIP)

5. MULT TOTAL KEY (1) LATCHED, STUD IN NON-ADD LOCK LEVER TO BE FULLY POSITIONED BEHIND FLANGE ON TOTAL CAM.

ADJ: FORM EAR (V) PLATE 9A, ON SPACE-OVER BELLCRANK SHAFT ASSEMBLY (4).

MULT TOTAL KEY OPERATION

PLATES 9 & 9A

6. ~~CHECK MULT TOTAL LINK (19) FOR FREE ON STUD OF ARM (A) AND STUD OF SPACE-OVER BELLCRANK SHAFT ASSEMBLY (4)~~. MULT TOTAL KEY (1) DEPRESSED, ARM (A) TO BE POSITIONED IN FRONT OF LATCH (B).

ADJ: FORM MULT TOTAL LINK (19).

7. MACHINE NORMAL, NEGATIVE MOTOR DRIVE ENGAGING PAWL (M) PLATE 9, TO HAVE SAFE HOLD ON EXTENSION OF NEGATIVE MULTIPLIER MOTOR DRIVE RETAINING LATCH (14), PLATE 5.

ADJ: RECHECK INSPECTION #4. FORM EAR (L) PLATE 9, ON MULT TOTAL INTERLOCK ARM (13).

8. MACHINE NORMAL, MULT TOTAL INTERLOCK ARM (15) TO CLEAR NEGATIVE MULT CUT-OUT ARM (13) BY .020. MULTIPLY KEY DEPRESSED, MULT TOTAL INTERLOCK ARM (15) TO FULLY ENGAGE NEGATIVE MULT CUT-OUT ARM (13) ~~AND EXTENSION (K) TO BE CENTERED IN SLOT OF ARM (13)~~.

ADJ: ~~PROVIDING MULTIPLY KEYSTEM LOCK BAIL (16) CLEARS KEYSTEM EXTENSIONS BY .030 TO .060 AND IS FREE~~, FORM EAR (J) ON MULT TOTAL INTERLOCK ARM (15) FOR .020 CLEARANCE. ~~TWIST EXTENSION (H) ON SPACE-OVER SHAFT ARM (4) FOR CENTERING EXTENSION (K). RECHECK INSPECTION #4.~~

9. ONE AND SPACES IN STOP SECTION, AFTER FIRST MULT KEY OPERATION, DEPRESS MULT TOTAL KEY (1) AND TURN MAINSHAFT FORWARD SLOWLY. CHECK HOOKED PORTIONS (S), PLATE 9A, OF HAMMER BLOCK SLIDE LATCHES (24) FOR ENGAGING EXTENSIONS (R) OF HAMMER BLOCK SLIDES (26). ADJ! CHECK LATCHES (24) FOR FREE.

9A. MACHINE IN SAME POSITION, CHECK LATCH ARM (30) ON RIGHT END OF HAMMER BLOCK SLIDE LATCH PIVOT SHAFT (34) FOR OVERLATCHING PIVOT SHAFT LATCH (31).

ADJ: CHECK MAINSHAFT FOR MOVING ALL THE WAY FORWARD ~~AND BACKSPACE CAM FOR TIGHT~~. CHECK LEFT UNIVERSAL SHAFT ARM (37) FOR TIGHT OR TWISTED. CHECK HAMMER BLOCK SLIDE LATCHES (24) FOR FREE AND PROPER SPRING TENSION OF SPRINGS (25). CHANGE ROLL (W) ON HAMMER BLOCK SLIDE LATCH DRIVE ARM (17). FOR INDIVIDUAL ADJUSTMENT OF LATCHES (24) ENGAGING EXTENSIONS (R) OF HAMMER BLOCK SLIDES (26), FORM EXTENSIONS (R) TO FRONT OR REAR OF MACHINE. FORM HOOKED PORTIONS (S) OR REPOSITION HAMMER BLOCK SLIDE GUIDE COMB FOR SIDEWAYS HOLD.

10. MULT TOTAL KEY (1) PLATE 9, DEPRESSED, MAINSHAFT ALL THE WAY FORWARD, EXTENSION (C) ON MULT LATCH KICK-OFF LINK (5) TO CONTACT MULT TOTAL KEYSTEM PAWL (3) WITH A FULL HOLD AND DRIVE PAWL (3) OFF STUD (B) IN SPACE-OVER BELLCRANK ARM (4) BY .010 TO .015 WITHOUT LIMITING ON BASE. ~~MACHINE NORMAL, CHECK MULT LATCH KICK-OFF LINK (5) FOR SLIGHT AMOUNT OF PLAY~~.

ADJ: REPOSITION MULT LATCH KICK-OFF ARM (6) ON HAMMER BLOCK SLIDE LATCH PIVOT SHAFT (34).

MULT TOTAL KEY OPERATION

PLATES 9 & 9A

11. ON FORWARD STROKE OF TOTAL OPERATION, TOTAL RELEASE PAWL (28) PLATE 9A, SHOULD OVERLATCH EAR (T) ON PIVOT SHAFT LATCH (31) BY .010 TO .020 ~~AND RELEASE PIVOT SHAFT LATCH (31) FROM PIVOT SHAFT LATCH ARM (30) ON RETURN STROKE.~~

ADJ: CHECK STUD IN LEFT FEATURE KEY LATCH ARM AND PIVOT STUD FOR TOTAL RELEASE PAWL (28) IN RIGHT FEATURE KEY RELEASE ARM (29) FOR STRAIGHT. IF NECES~~SARY~~, FORM EAR (T) ON PIVOT SHAFT LATCH (31).

12. ON TOTAL STROKE, HAMMER BLOCK SLIDE LATCHES (24), PIVOT SHAFT (34), MULT LATCH KICK-OFF LINK (5), HAMMER BLOCK SLIDE LATCH BAIL (23) AND HAMMER BLOCK SLIDE LATCH DRIVE ARM (17) SHOULD BE FREE TO NORMALIZE.

ADJ: CHECK PARTS FOR FREE AND SPRING (35) FOR PROPER TENSION.

INTERLOCKS

PLATES 10 AND 11

1. ANY MULTIPLY KEY LATCHED, LINK (2) SHOULD RAISE LATCH (4) TO CLEAR BLOCK ARM (6) BY .030.

ADJ: FORM OFFSET IN LINK (2).

2A. MACHINE NORMAL, EXTENSION (J) SHOULD BE FULLY POSITIONED UNDER MULT TOTAL KEY BUTTON (20).

ADJ: CHECK MULT TOTAL KEY (21) FOR FULLY RESTORING AND KEYBOARD INTERLOCK SLIDE (17) FOR FREE AND PROPER SPRING TENSION.

2B. BLOCK ARM (6), WHEN RELEASED, SHOULD POSITION SLIDE (17) TO BLOCK THE UNIVERSAL BAR, SUBTRACT, NON-ADD KEYS AND TOTAL BAR; ALSO, EXTENSION (J) SHOULD CLEAR MULT TOTAL KEY BUTTON (20).

ADJ: CHECK FOR BINDS AND PROPER SPRING TENSION. FORM EXTENSION (J) TO LEFT OR RIGHT.

3. AS THE TOTAL SLIDE (5) MOVES REARWARD, STUD (V) MUST CONTACT LOWER EXTENSION OF BLOCK ARM (6) AND RELATCH IT WITH LATCH (4).

ADJ: FORM LOWER EXTENSION OF ARM (6) FOR ALIGNMENT WITH STUD (V). FORM OFFSET IN LATCH (4).

4. DIVISION KEY (10) DEPRESSED, BLOCK ARM (12) TO RELEASE CATCH ASSEMBLY (13). CATCH ASSEMBLY (13) SHOULD ROTATE TO BLOCK MULTIPLIER HAMMER AND LEAVE DIVISION HAMMER FREE TO PRINT.

ADJ: CHECK CATCH ASSEMBLY (13) FOR FREE AND SPRING (14) FOR PROPER TENSION. FORM CATCH ASSEMBLY (13) FOR BLOCKING HAMMERS.

5. MACHINE NORMAL, EXTENSION (C) SHOULD JUST CLEAR PAWL (D) FOR PROPER POSITIONING OF SLIDE (17) WHEN DIVISION KEY IS DEPRESSED, AND EXTENSION (K) TO JUST CLEAR MULT TOTAL KEY BUTTON (20).

ADJ: FORM EXTENSION (C) OR (K).

6. DIVISION KEY (10) DEPRESSED, EXTENSION (N) SHOULD HOLD PAWL (M) CLEAR OF STUD (R) BY .040.

ADJ: FORM OFFSET AT FRONT OF LINK (11).

INTERLOCKS

PLATES 10 AND 11

7. AS THE TOTAL SLIDE (5) MOVES REARWARD ON TOTAL STROKE OF DIVISION, STUD (F) MUST DRIVE LOWER EXTENSION OF (13) TO THE REAR FOR BLOCK ARM (12) TO RESTORE AND BLOCK EXTENSION (E).

ADJ: CHECK BLOCK ARM (12) FOR FREE AND PROPER SPRING TENSION OF (9).

8. MOTOR BAR DEPRESSED AND MAINSHAFT FORWARD, KEYSTEM INTERLOCK (19) MUST BE FREE TO TRAVEL TO ITS DOWNLIMIT.

ADJ: CHECK INTERLOCK (19) FOR FREE AND PROPER SPRING TENSION (26).

9. MACHINE NORMAL, INTERLOCK (19) MUST BE HELD ABOVE LOCK ROLLS (S) TO PERMIT DEPRESSION OF MULTIPLY KEYS.

ADJ: CHECK MAINSHAFT AND UNIVERSAL DRIVE SHAFT FOR FULLY RESTORING. FORM ARM (P).

10. NON-ADD KEY LATCHED, ALL MULTIPLY KEYS MUST BE BLOCKED.

ADJ: FORM OFFSET IN LINK (28).

11. DEPRESS A MULTIPLY KEY 0 THRU 9 AND PERMIT BELLCRANK (1) TO MOVE REARWARD SLOWLY, MULTIPLY KEYSTEM INTERLOCK (19) MUST BE RELEASED BEFORE BELLCRANK (1) LIMITS.

ADJ: CHECK STUD (U) ON BAIL (27) FOR STRAIGHT. FORM LINK (29).

12. MACHINE NORMAL, PAWL (H), PLATE 11, SHOULD HAVE A SAFE HOLD ON EXTENSION (A).

ADJ: FORM PAWL (H).

13. STUD (B) TO HAVE A GOOD HOLD ON EXTENSION (C).

ADJ: FORM EXTENSION (C).

14. SLIDE (4) MUST BE PERFECTLY FREE AND HAVE CORRECT SPRING TENSION FOR PROPER POSITIONING.

PRINTING CONTROL FEATURE

PLATE 12

1. ITEM IN STOP SECTION, RELEASE LATCH (4) AND CHECK BAIL (3) FOR DOWN LIMITING SQUARELY ON FRONT TYPE RACK GUIDE COMB.

ADJ: FORM BAIL (3).

2. RELATCH BAIL (3) ON LATCH (4), STOP SECTION INDEXED FULLY TO THE LEFT, ALL HAMMERS FIRED, HAMMERS SHOULD CLEAR UNDER BAIL (3) BY .010.

ADJ: FORM RIGHT END OF BAIL (3).

PRINTING CONTROL FEATURE

PLATE 12

3. STOP SECTION NORMAL, RELEASE LATCH (4) AND PULL MANUAL BACKSPACE KEY ALL THE WAY TO THE RIGHT, LIP (B) OF BAIL (3) SHOULD JUST RELATCH WITH LATCH (4).

ADJ: REMOVE EXCESS END PLAY IN RESET GEARS. CHANGE ROLL (D).

4. BACKSPACER ON HIGH POINT OF BACKSPACE CAM, LATCH (4) TO CLEAR UNDERSIDE OF EXTENSION (B) BY .010.

010

ADJ: FORM LINK (5) OR TIP STUD IN LATCH (4).

5. MACHINE NORMAL, PRINTING HAMMER CATCH SHAFT FULLY RESTORED, LATCH (11) TO CLEAR BELOW EXTENSION (B) BY .030.

ADJ: FORM LIP ON LATCH (11).

REPEAT SHAFT ARM LATCH

PLATE 13

1. MACHINE NORMAL, DIVISION KEY (1) FULLY RESTORED, REPEAT SHAFT ARM LATCH EXTENSION (D) SHOULD BE HELD CLEAR OF EXTENSION (F) BY AT LEAST .060 WITHOUT UPLIMITING ON REPEAT SHAFT ARM PIVOT SHAFT.

ADJ: FORM BAIL PART OF REPEAT SHAFT ARM LATCH (4).

2. A. MACHINE NORMAL, DIVISION KEY (1) DEPRESSED, INNER LINK EXTENSION (E) SHOULD HOLD REPEAT SHAFT ARM (6) WITHIN .010 OF A LIMIT.

ADJ: FORM INNER LINK (E) OR EXTENSION ON REPEAT SHAFT ARM (6).

B. MACHINE IN SAME POSITION, EXTENSION (D) OF LATCH (4) TO OVERLATCH EXTENSION (F) BY .010 TO .020.

ADJ: FORM LATCH (4) IN OFFSET.

3. DIVISION KEY (1) DEPRESSED, LATCH (A) RESTING AGAINST FRONT OF LATCH (B), EXTENSION (C) ON LINK (2) SHOULD HOLD EXTENSION (D) .060 ABOVE EXTENSION (F). LATCH (A) FULLY ACTUATED, REPEAT SHAFT ARM LATCH (4) NOT TO LIMIT ON REPEAT SHAFT ARM PIVOT SHAFT.

ADJ: RECHECK ADJUSTMENT 1. FORM EXTENSION (C).

TYPE RACK LOCK BAIL

PLATE 14

1. MACHINE NORMAL, TYPE RACK LOCK BAIL (1) TO BE ALIGNED SIDEWISE FOR EXTENSION (A) TO HAVE A FULL HOLD ON STUDS (B) AND NOT RUB THE SIDES OF THE TYPE RACKS.

ADJ: REMOVE SIDE PLAY IN HAMMER TRIP SHAFT BY USING SPACERS ON OUTSIDE OF RIGHT SIDE FRAME OR REPOSITIONING HAMMER FIRING ARM. POSITION SET COLLARS (6).

TYPE RACK LOCK BAIL

PLATE 14

2. MACHINE NORMAL, STUD (F) SHOULD BE AT LEAST .030 OVERLATCHED WITH LATCH (9).

   ADJ: CHANGE ROLL (D).

3. MACHINE NORMAL, TYPE RACK LOCK BAIL EXTENSIONS (A) TO HAVE LESS THAN .050 CLEARANCE OVER STUDS (B) AND NOT DOWNLIMIT ON THEM.

   ADJ: FORM RIGHT END OF BAIL (1).

4. ROW OF NINES IN MACHINE, TURN MAINSHAFT FORWARD. STUDS (B) SHOULD CLEAR END OF EXTENSIONS (A) BY AT LEAST .050.

   ADJ: FORM EXTENSION (G).

POSITIVE RACK RESTORING MECHANISM

PLATE 15

1. MACHINE NORMAL, DEPRESS A ROW OF CIPHER STOPS AND TURN MAINSHAFT 1/4 WAY FORWARD. CHECK FOR .008 TO .012 LUG CLEARANCE. ALSO CHECK FOR .020 CAM CLEARANCE.

2. MACHINE NORMAL, USING A SPRING HOOK OR THIN SCREWDRIVER, PRESS EXTENSION (B) ON RACK RESTORING ACTUATOR LINK (4) REARWARD TO CHECK FOR FREE MOVEMENT OF RACK RESTORING MECHANSIM.

HOLD NUMERAL KEY DOWN & YEILD M.S. WATCH FOR REARWARD MOVEMENT OF RACKS.

3. A. MACHINE NORMAL, PLACE ALL ACCUMULATOR RACKS IN CARRY POSITION. WITH A FULL ROW OF SPACE STOPS DEPRESSED, TURN MAINSHAFT COMPLETELY FORWARD WATCHING THE CARRY PAWLS TO MAKE SURE THEY RESTORE BACK TO NORMAL POSITION. AT THIS TIME CHECK FOR .007 LUG CLEARANCE.

   ADJ: FORM EXTENSION (B) TO LIMIT SOONER OR LATER AGAINST STUD (A) IN SIDE FRAME. IT MAY BE NECESSARY TO CHANGE ROLL (2) FOR MORE DRIVE.

   B. MACHINE NORMAL, ALL ACCUMULATOR RACKS IN CARRY POSITION, CHECK RACK RESTORING PLATE (6) FOR SLIGHT AMOUNT OF REARWARD MOVEMENT BEFORE CONTACTING ACCUMULATOR RACKS.

   ADJ: CHECK ALL PARTS FOR FREE AND RECHECK INSPECTION 3A.

4. MACHINE NORMAL, INSERT A FULL ROW OF 505050'S AND TURN MAINSHAFT COMPLETELY FORWARD. TEETH OF ACCUMULATOR RACKS SHOULD BE EVENLY ALIGNED. ALSO CHECK PRINTING ALIGNMENT. IF ALIGNMENT IS OFF IT INDICATES POSITIVE RACK RESTORING MECHANISM IS DRIVING TOO FAR.

   ADJ: RECHECK INSPECTION 3A.

NON-ADD AND SUB-TOTAL MECHANISM

PLATE 16

1. A. THE INITIAL POSITION OF THE CHARACTER SELECTOR SHAFT IS MADE BY LOOSENING THE CHARACTER STOP AND PLACING STUD (H) IN THE LEFT ARM OF SELECTOR SHAFT DOWN ON THE TOTAL SLIDE AND THE CHARACTER STOP RESTING ON THE LUG OF THE CHARACTER RACK AND TIGHTENING SCREW. MAKE SURE SELECTOR SHAFT HAS A SLIGHT AMOUNT OF END PLAY.

   B. MACHINE NORMAL, STUD (L) IN NON-ADD LOCK LEVER (9) SHOULD BE TO FRONT OF FLANGE ON TOTAL CAM BY .015.

   ADJ: FORM EXTENSION (K) OF ACCUMULATOR CAM SUPPORT BRACKET (10).

2. NON-ADD KEY LATCHED, STUD (L) IN NON-ADD CAM LOCK LEVER ASSEMBLY (9) SHOULD BE POSITIONED BEHIND FLANGE OF TOTAL CAM AND NON-ADD SYMBOL SHOULD PRINT ON NON-ADD OPERATION.

   ADJ: FORM EXTENSION (A) FOR MORE THROW.

3. SUB-TOTAL KEY LATCHED, SUB-TOTAL BELLCRANK (1) SHOULD POSITION YIELDING PAWL (E) IN PATH OF ROLL (D) AND ON SUB-TOTAL OPERATION, SUB-TOTAL SYMBOL TO PRINT.

   ADJ: FORM TOTAL SLIDE (6) TO MOVE ROLL (D) TO THE REAR OR CHANGE ROLL (D) FOR MORE DRIVE.

4. MACHINE NORMAL, PAWL (B) SHOULD REST ON TOP OF LIP (C). AS THE TOTAL SLIDE (6) MOVES TO THE REAR, PAWL (B) TO DROP BEHIND LIP (C) AND UNLATCH SUB-TOTAL KEY ON RETURN STROKE.

   ADJ: CHECK PAWL (B) FOR FREE AND PROPER SPRING TENSION.

CREDIT BALANCE

PLATES 17 AND 18

1. MACHINE NORMAL, BLANK STROKE LOCK BELLCRANK (1) TO HAVE .005 MOVEMENT.

   ADJ: FORM EXTENSION OF BELLCRANK (1) THAT CONTACTS STOP SECTION.

2. MACHINE NORMAL, ITEM IN STOP SECTION, OUTER BLOCK ARM (6) TO HAVE FULL HOLD ON STUD (A) IN NEGATIVE TOTAL LINK OPERATING ARM PAWL (8).

   ADJ: FORM LINK (7).

3. MACHINE NORMAL, THE SUBTRACT YIELD ARM (11) TO HAVE NO FURTHER DOWNWARD MOVEMENT.

   ADJ: FORM ARM (11).

MODEL 99 INSPECTIONS AND ADJUSTMENTS

CREDIT BALANCE

PLATES 17 AND 18

4. SUBTRACT KEY DEPRESSED AND MAINSHAFT FORWARD, THE SUBTRACT YIELD ARM (11) SHOULD CLEAR THE BOTTOM OF STUD IN RIGHT CENTER FRAME NOT MORE THAN .005.

   ADJ: FORM OUTER EXTENSION OF SUBTRACT OPERATING ARM.

5. NEGATIVE TOTAL LINK (5) TO BE FREE AND REST AGAINST THE DIVISION SHAFT.

6. THE NEGATIVE TOTAL LINK OPERATING ARM PAWL (8) MUST CLEAR EXTENSION ON THE NEGATIVE TOTAL LINK (5) BY .015 ON A POSITIVE OPERATION.

   ADJ: SHORTEN OR LENGTHEN NEGATIVE TOTAL LINK (5).

7. NEGATIVE TOTAL IN MACHINE, MAINSHAFT ALL THE WAY FORWARD, THE SUBTRACT YIELD ARM (11) SHOULD CLEAR THE BOTTOM OF STUD IN RIGHT CENTER FRAME NOT MORE THAN .005.

   ADJ: FORM SUBTRACT SLIDE SHIFT PLATE LIFT ARM (3).

8. MACHINE NORMAL, POSITIVE POSITION AND ITEM IN STOP SECTION, STUD (A) IN THE NEGATIVE TOTAL LINK OPERATING ARM PAWL (8) TO CLEAR THE LONGEST BLOCK ARM (6) OR (9) BY .010.

   ADJ: CHANGE POSITION OF TOTAL LOCK CAM ADJUSTING PLATE ON THE TOTAL LOCK CAM.

9. WHEN SHIFTING FROM POSITIVE TO NEGATIVE ON A BLANK STROKE OPERATION, THE SUBTRACT SLIDE SHIFT PLATE (10) SHOULD BE POSITIONED SOON ENOUGH FOR AT LEAST .035 CLEARANCE BETWEEN ITS LIP AND THE SUBTRACT STUD BEFORE THE STUD CONTACTS THE LIP.

   ADJ: RECHECK INSPECTIONS 7 AND 8.

10. MACHINE NORMAL, LIFT ARM STUD (E) SHOULD HAVE .010 MOVEMENT BETWEEN CENTER FRAME LIMIT AND EXTENSION (L) OF THE SUBTRACT SLIDE (12). THIS SHOULD POSITION HOOK (J) FOR A GOOD HOLD ON STUD (M).

    ADJ: FORM LIP (L).

11. SUBTRACT KEY DEPRESSED, MAINSHAFT ALL THE WAY FORWARD, LIFT ARM STUD (E) TO HAVE .010 MOVEMENT BETWEEN CENTER FRAME LIMIT AND EXTENSION (F). THIS SHOULD POSITION HOOK (H) FOR A GOOD HOLD ON STUD (G).

    ADJ: FORM LIP (F).

12. CREDIT BALANCE CARRY PAWL CAM ASSEMBLY (19) TO BE MESHED WITH CREDIT BALANCE BELLCRANK (17) AS SHOWN ON PLATE 18.

13. CARRY PAWL CAM ASSEMBLY (19) SHOULD HAVE .005 TO .008 END PLAY.

    ADJ: USE SPACERS BETWEEN FRAME AND HEAD OF CAM ASSEMBLY (19) PIVOT SCREW.

CREDIT BALANCE

PLATES 17 AND 18

14. MACHINE IN POSITIVE POSITION, CAM ASSEMBLY (19) EXTENSION (K) SHOULD CLEAR STUD IN UNITS CARRY PAWL (25) BY .010 TO .015. MACHINE IN NEGATIVE POSITION, EXTENSION (K) SHOULD CLEAR THE STUD BY .010 TO .015.

    ADJ: FORM LOWER EXTENSION OF CAM ASSEMBLY (19) TO LIMIT STUD AGAINST CENTER FRAME SOONER OR LATER.

15. WITH UNITS CARRY PAWL LATCHED IN CARRY POSITION, CAMMING SURFACE (K) TO CLEAR STUD IN UNITS CARRY PAWL BY .010 TO .015 AS IT PASSES OVER STUD.

    ADJ: FORM EXTENSION OF UNITS CARRY PAWL (25) UP OR DOWN.

16. CARRY PAWL CAM ASSEMBLY (19) MUST BE FREE AND WHIP SPRING MUST HAVE SUFFICIENT TENSION. SPRING MUST BE HOOKED WITH LOOP DOWN AND TO THE REAR.

17. MACHINE POSITIVE, INNER BLOCK ARM (9) SHOULD HAVE A SAFE BLOCKING HOLD ON STUD (A) IN NEGATIVE TOTAL LINK OPERATING ARM PAWL (8). MACHINE NEGATIVE, BLOCK ARM (9) MUST CLEAR STUD (A).

    ADJ: FORM INNER BLOCK ARM (9) OR OPERATING LINK (20).

18. NEGATIVE CHARACTER PRINTING ARM (23) TO BE FREE AND CLEAR THE CHARACTER TYPE RACK. SPRING (24) MUST HAVE SUFFICIENT TENSION FOR THE PRINTING OF A LEGIBLE "CR" SYMBOL.

19. THE FORWARD EXTENSION OF THE NEGATIVE CHARACTER PRINTING ARM (23) SHOULD HAVE A FULL HOLD ON EXTENSION OF THE SUBTRACT SLIDE (12) WHEN THE MACHINE IS IN ADD POSITION.

    ADJ: FORM EXTENSION OF PRINTING ARM (23).

20. MAINSHAFT ALL THE WAY FORWARD, THE NEGATIVE CHARACTER PRINTING ARM LATCH (22) TO BE LOWERED TO CLEAR THE PRINTING ARM (23) BY .030 TO .040.

    ADJ: FORM THE NEGATIVE CHARACTER PRINTING ARM LATCH (22).

21. MACHINE NORMAL NEGATIVE, THE NEGATIVE CHARACTER PRINTING ARM (23) TO BE RESTORED FAR ENOUGH FOR THE NEGATIVE CHARACTER PRINTING ARM LATCH (22) TO LATCH WITH .030 TO .040 CLEARANCE.

    ADJ: FORM LOWER EXTENSION OF PRINTING ARM (23) WHERE THE HAMMER RESTORING ARM CONTACTS IT.

22. DIVISION KEY DEPRESSED, BELLCRANK (14) AND PAWL ASSEMBLY (15) SHOULD NOT BE UPLIMITING. AUTOMATIC REMAINDER LINK LATCHED ON ITS LATCH, EXTENSION (F) SHOULD CLEAR OVER STUD (E) BY .060.

    ADJ: FORM BELLCRANK (14).

DISMANTLE and RE-ASSEMBLE PROCEDURE

Model 99

MODEL 99 DISMANTLING PROCEDURE

PART NUMBER AND PLATE WHERE PART MAY BE FOUND ARE LISTED AFTER PART NAMES.

REMOVING MULTIPLIER UNIT

LEFT SIDE:

A. REMOVE KEEPER FOR LINK (20-2) AND DISCONNECT LINK FROM LATCH ACTUATOR (21-2).

B. REMOVE KEEPER FROM STUD IN MULTIPLY MECHANISM OPERATING SLIDE (28-2), DISCONNECT DIVISION INTERLOCK ARM LATCH LINK (2-10) AND REMOVE ROLL (S-2). DISCONNECT MULTIPLY MECHANISM OPERATING SLIDE (28-2) FROM MULTIPLY NON-PRINT BELLCRANK (22-2).

C. REMOVE KEEPER FROM FRONT END OF MULTIPLY INTERLOCK LINK (29-10) AND REMOVE LINK FROM MACHINE.

D. REMOVE KEEPER FROM FRONT END OF NON-PRINT BELLCRANK SLIDE (18-7) AND DISCONNECT FRONT END OF LINK FROM NON-PRINT BELLCRANK (12-7).

E. REMOVE KEEPER FROM STUD IN MULTIPLY NON-ADD BELLCRANK (10-7) AND DISCONNECT ZERO TYPE DRIVE SLIDE (31-8A).

F. DISCONNECT MULTIPLY NON-ADD BELLCRANK LINK (5-7) FROM STUD IN MULTIPLY NON-ADD BELLCRANK (10-7) AND FROM STUD ON NON-ADD BELLCRANK (5-16) BY REMOVING KEEPERS.

G. REMOVE KEEPER FROM FRONT END OF MULTIPLY INTERLOCK BAIL OPERATING LINK (11-10). REMOVE KEEPER AT REAR FROM STUD IN PRINTER HAMMER CATCH ASSEMBLY (13-10) AND REMOVE LINK (11-10) FROM MACHINE.

H. UNHOOK SPRING (14-9) FROM NEGATIVE MULTIPLY CUT-OUT ARM (13-9).

RIGHT SIDE:

A. REMOVE THE MD CONTROL CONNECTOR LINK (10-1) FROM UPPER STUD IN MD CONTROL BELLCRANK (12-1) BY REMOVING KEEPER.

B. UNHOOK SPRING FROM STUD IN MULTIPLY KEYSTEM LOCK RELEASE PAWL (B-1) AND REMOVE KEEPER. DISCONNECT KEYSTEM LOCK PAWL RETAINING LINK (9-1).

C. REMOVE KEEPER FROM STUD IN KEYSTEM RETURN BAIL ARM (12-4) TO DISCONNECT FRONT END OF KEY RETURN BAIL OPERATING LINK (2-4). UNHOOK SPRING FROM END OF SHAFT IN MULTIPLY SECTION TO DISCONNECT KEYSTEM RETURN BAIL OPERATING PAWL (1-4).

D. DISCONNECT KEYSTEM LOCK RELEASE LINK (10-4) BY REMOVING KEEPER FROM STUD ON KEYSTEM LOCK BAIL (8-4).

E. REMOVE FOUR LOWER AND TWO UPPER MULTIPLY UNIT MOUNTING SCREWS AND REMOVE MULTIPLIER UNIT FROM MACHINE.

MODEL 99 DISMANTLING PROCEDURE

REMOVING MISC. PARTS

REMOVE KEEPER FROM AUTOMATIC TOTAL MULTIPLY MOTOR DRIVE LATCH LINK (12-6) AND REMOVE THIS LINK FROM STUD IN MD CONTROL ARM LATCH ASSEMBLY (11-6). UNHOOK SPRING AT REAR OF LINK (17-6) AND REMOVE THIS LINK FROM MACHINE BY DISCONNECTING IT FROM AUTOMATIC TOTAL MULTIPLY LATCH BEARING SCREW.

REMOVE AUTOMATIC TOTAL MULTIPLY LATCH (7-6) BY REMOVING KEEPER FROM STUD IN FEATURE KEY LATCH SHAFT (8-6) AND PIVOT SCREW FROM RIGHT END OF REAR STOP SECTION RAIL.

REMOVE KEEPER FROM REAR END OF KEY RETURN BAIL OPERATING LINK (2-4) AND REMOVE LINK.

REMOVE SCREW FROM OUTER END OF BLANK STROKE LOCK BELLCRANK PIVOT SCREW.

DISCONNECT SPRING ON PAWL (C-1).

DISCONNECT SPRING (2-1) OF MOTOR DRIVE CONTROL ARM LATCH ASSEMBLY (5-1).

DISCONNECT SPRING (1-1) ON MULTIPLY MD BELLCRANK LATCH (17-1) AND REMOVE BELLCRANKS 5, 8 AND 17.

DISCONNECT SPRING AND REMOVE HAMMER CATCH SHAFT LATCH ASSEMBLY (20-5A) BY REMOVING TRUNION NUT ON END OF RESET GEAR SHAFT ASSEMBLY (24-5A).

REMOVE AUTOMATIC TOTAL MULTIPLY LATCH BAIL LINK (6-6) BY REMOVING KEEPERS AT EACH END.

REMOVE UNIVERSAL SHAFT DRIVE LINK (26-2) BY REMOVING KEEPERS AT EACH END AND UNHOOKING SPRING (25-2). REMOVE NEGATIVE MULTIPLY TYPE DRIVE CAM RETURN PAWL (18-8A), SPRING (37-8A) AND SPACER FROM BACKSPACE CAM. REMOVE NON-PRINT RESTORING ARM PAWL (24-2).

DISCONNECT LINK (Q-5) HOOKED TO NEGATIVE MULTIPLY OPERATING ARM LATCH RELEASE BY REMOVING KEEPER.

REMOVE MULTIPLY MECHANISM OPERATING SLIDE (28-2) BY UNHOOKING SPRING (29-2) AND DISCONNECTING SLIDE (28-2) FROM STUD (27-2) IN BASE.

REMOVE KEEPER AND WASHER FROM LEFT END OF DIVISION SHAFT, UNHOOK SPRING (26-5A) FOR NEGATIVE MULTIPLY OPERATING ARM (16-5A) AND SPRING (9-8) FOR NEGATIVE MULTIPLY TYPE DRIVE SLIDE (12-8) THEN REMOVE OPERATING ARM (16-5A) AND DRIVE SLIDE (12-8). REMOVE WASHER FROM STUD (27-2).

UNHOOK DIVISION SHAFT DRIVE ARM SPRING.

UNHOOK SPRING (26-8A) FROM STUD IN NEGATIVE MULTIPLY MECHANISM MD ARM ASSEMBLY (25-8A). REMOVE KEEPER FROM SAME STUD. UNHOOK SPRING (30-8A) AT CENTER OF NEAGTIVE MULTIPLY MOTOR DRIVE SLIDE (28-8A) FROM STUD (29-8A) AND REMOVE NEGATIVE MULTIPLY MOTOR DRIVE SLIDE (28-8A) FROM MACHINE.

UNHOOK SPRING FROM STUD IN BASE FOR MULTIPLY CAM LINK LIMIT ARM (11-8) AND REMOVE ARM.

MODEL 99 DISMANTLING PROCEDURE

REMOVING MISC. PARTS

UNHOOK SPRING (35-9A) AND REMOVE KEEPER FROM HAMMER BLOCK SLIDE LATCH DRIVE ARM (17-9A). REMOVE NEGATIVE MULTIPLY ARM LATCH SUPPORT BRACKET (18-2) BY REMOVING TWO SCREWS FROM LEFT SIDE OF KEYBOARD AND UNHOOKING SPRING (3-10) FROM DIVISION INTERLOCK LATCH (4-10).

UNHOOK SPRING FROM STUD IN LEFT SIDE FRAME FOR MULTIPLY ZERO TYPE DRIVE SLIDE (31-8A) AND REMOVE SLIDE.

REMOVE DIVISION INTERLOCK ARM LATCH (4-10) AND LINK (2-10) BY DISCONNECTING SPRING (18-10) FROM TOTAL YOKE PIVOT SHAFT.

REMOVE MULTIPLY NON-PRINT SLIDE (18-7) BY UNHOOKING SPRING (4-7) FROM STUD IN LEFT SIDE FRAME AND SPRING (3-7) FROM NON-PRINT BELLCRANK (2-7)

REMOVING THE PRINTING HAMMER CATCH SHAFT ASSEMBLY

UNHOOK SPRING (14-10) FROM STUD IN PRINTING HAMMER CATCH ASSEMBLY (13-10). THE OTHER END OF THIS SPRING IS HOOKED TO AN EYE IN THE LEFT RIBBON BRACKET. REMOVE KEEPER FROM STUD IN LATCH (9-A) AND DISCONNECT MULT TOTAL LINK (19-9A) AND AUTOMATIC TOTAL MULTIPLY BELLCRANK OPERATING LINK (1-6). REMOVE KEEPER FROM RIGHT END OF PRINTER HAMMER CATCH SHAFT ASSEMBLY. LOOSEN SCREW IN SET COLLAR LOCATED ON RIGHT SIDE OF LEFT CENTER FRAME. UNHOOK SPRING FROM RIGHT RIBBON BRACKET. THE OTHER END OF THIS SPRING HOOKS TO ARM NEAR RIGHT END OF PRINTER HAMMER CATCH SHAFT. REMOVE SPRING (12-12) AND KEEPER FROM STUD IN RIGHT ARM OF MULTIPLY AND DIVISION NON-PRINT BAIL ASSEMBLY (3-12) FOR NON-PRINT BAIL RESTORING LINK (10-12). LOOSEN ALLEN SCREWS IN LEFT AND RIGHT ARMS ON CATCH SHAFT ASSEMBLY. REMOVE SPRING (13-12) FROM PRINTING CONTROL BAIL ASSEMBLY (3-12). THIS SPRING HOOKS TO STUD IN RIGHT CENTER FRAME. SLIDE AUTOMATIC TOTAL MULTIPLY RELEASE BELLCRANK (3-6) TOWARD RIGHT, OFF END OF SHAFT. PULL CATCH SHAFT TOWARD RIGHT AND REMOVE LEFT ARM AND BELLCRANK (3-6) OFF END OF CATCH SHAFT. REMOVE COLLAR AND PRINTER HAMMER CATCH ASSEMBLY (13-10). REMOVE INNER RIGHT ARM AND MULTIPLY AND DIVISION NON-PRINT BAIL (3-12).

UNIVERSAL DRIVE SHAFT

REMOVE BACKSPACE DRIVE ARM, LONG, BACKSPACE DRIVE ARM, SHORT (11-5) AND BACKSPACE DRIVE PAWL (10-5).

DISCONNECT SPRING CONNECTING DRIVE PAWL AND KEYBOARD. ALSO, DISCONNECT SPRING FROM BACKSPACE DRIVE ARM, LONG.

REMOVE SCREW STUD FROM RIGHT END OF BLANK STROKE LOCK BELLCRANK BY REMOVING NUT. REMOVE KEEPER FROM LEFT END AND REMOVE BLANK STROKE LOCK BELLCRANK (7-4). REMOVE AIR CHECK. LOOSEN LIMIT BLOCK FOR BACKSPACE SLIDE AND CORRECTION SLIDE AND REMOVE SLIDES AFTER DISCONNECTING SPRING FROM BACKSPACE SLIDE AND SPRING FROM CORRECTION SLIDE.

REMOVE NON-PRINT BELLCRANK RESTORING ARM (23-2) BY REMOVING KEEPER. DRIVE PIN IN LEFT UNIVERSAL SHAFT ARM (27-8A) AND LOOSEN SET SCREW IN COLLAR NEXT TO LEFT SIDE FRAME. PULL SHAFT TO RIGHT AND NOTE WASHER BETWEEN NEGATIVE MULTIPLY MOTOR DRIVE ARM (25-8A) AND NEGATIVE MULTIPLY CUT-OUT ARM (13-9). REMOVE LEFT UNIVERSAL SHAFT

UNIVERSAL DRIVE SHAFT CONT'D.

ARM (27-8A) WITH HAMMER BLOCK SLIDE LATCH DRIVE PAWL (18-9A), NEGATIVE MULTIPLY MOTOR DRIVE ARM (25-8A) AND NEGATIVE MULTIPLY CUT-OUT ARM (13-9). DRIVE PIN FROM ARM (P-10) IN CENTER OF UNIVERSAL DRIVE SHAFT (12-5). PULL SHAFT TO RIGHT AND REMOVE COLLAR ON LEFT END AND SPACER ON RIGHT END. REMOVE NEGATIVE MULTIPLY TYPE DRIVE BAIL (6-5).

REMOVING KEYBOARD

REMOVE CORRECTION SLIDE LIMIT BY REMOVING SCREW IN FRONT CORNER OF LEFT SIDE FRAME.

REMOVE CORRECTION AND BACKSPACE SLIDES.

REMOVE STOP SECTION CONTROL SLIDE LATCH (7-5) BY DISCONNECTING SPRING AND REMOVING SCREW.

REMOVE STOP SECTION CONTROL SLIDE ASSEMBLY (8-5) AFTER REMOVING KEEPER AT RIGHT END OF SLIDE HOLDING ESCAPEMENT ARM (2-5) AND DISCONNECTING SPRING AT LEFT END OF SLIDE. WORK CONTROL SLIDE CAREFULLY AND REMOVE FROM FRONT OF MACHINE.

REMOVE CORRECTION AND BACKSPACE SLIDE PLATE BY REMOVING SCREWS AND LOCKWASHERS.

REMOVE MOTOR KEYSTEM MOUNTING SCREW. REMOVE MOTOR BAR, DECIMAL KEYSTEM, BUSHING AND SPACER.

REMOVE KEEPER AND .005 WASHER AND REMOVE LOCK PLATE LINK BELLCRANK; ALSO, REMOVE BLANK STROKE LOCK ARM. DISCONNECT TOTAL LINK AND TOTAL SLIDE (6-16) FROM TOTAL YOKE BY REMOVING KEEPERS. UNHOOK SUB-TOTAL LATCH SPRING. REMOVE TOTAL YOKE PIVOT SHAFT. REMOVE TOTAL YOKE.

REMOVE KEEPER ON EXTEND KEY EXTENSION.

UNHOOK NUMERAL KEYLOCK SPRING.

REMOVE KEEPER FROM SUB-TOTAL BELLCRANK ASSEMBLY (1-16).

REMOVE MULT TOTAL KEY BUTTON (20-10).

REMOVE KEEPER FROM STUD IN LEFT SIDE FRAME FOR NON-ADD FEATURE KEY RELEASE LINK. REMOVE KEEPER (FRONT) AND RAISE FRONT OF NEGATIVE TOTAL LINK (5-17).

DISCONNECT STUD ON SUBTRACT OPERATING ARM FROM SUBTRACT KEYSTEM.

REMOVE KEEPER AT FRONT END OF TOTAL LOCK LINK AND DISCONNECT BLANK STROKE LOCK SHAFT.

DRIVE PIN IN LEFT DIVISION SHAFT ARM AND LOOSEN SCREW IN RIGHT DIVISION SHAFT ARM (13-17). SLIDE SHAFT TO RIGHT UNTIL IT IS FLUSH WITH LEFT CENTER FRAME.

REMOVE KEYBOARD MOUNTING SCREWS.

REMOVE KEYBOARD.

REMOVE SCREW STUD (N-9) IN MULT TOTAL KEYSTEM (1-9) AND REMOVE KEYSTEM (1-9).

REMOVING KEYBOARD CONT'D.

REMOVE MULT TOTAL LINK (19-9A).

REMOVE NON-ADD LINK (5-7).

REMOVING STOP SECTION

REMOVE LEFT STOP SECTION RAIL SCREW. THIS SCREW ALSO IS A MOUNTING SCREW FOR THE DIVISION CONTROL ARM (7-10), UNHOOK SPRING ON ARM.

REMOVE DIVISION CONTROL ARM (7-10), BEING CAREFUL NOT TO LOSE WASHER. UNHOOK STOP SECTION SPRING. REMOVE KEEPER ON STOP SECTION RESTORING ARM AND DISCONNECT ARM. REMOVE FRONT STOP SECTION RAIL. REMOVE STOP SECTION WITH REAR RAIL.

REMOVING HAMMER BLOCK SLIDE LATCH MECHANISM

DRIVE PIN IN SPACE-OVER BELLCRANK SHAFT ASSEMBLY (4-9). (THIS PIN DRIVES DOWNWARD.) REMOVE TWO KEEPERS FROM SHAFT ASSEMBLY AND REMOVE ASSEMBLY. UNHOOK HAMMER BLOCK SLIDE LATCH SPRINGS (25-9A). REMOVE MULT LATCH KICK-OFF LINK (5-9) BY REMOVING KEEPER. REMOVE HAMMER BLOCK SLIDE LATCH BAIL PIVOT SHAFT BY REMOVING THREE KEEPERS. REMOVE HAMMER BLOCK SLIDE LATCH RELEASE BAIL SHAFT (33-9A) BY REMOVING TWO KEEPERS. REMOVE HAMMER BLOCK SLIDE LATCH BAIL (23-9A). DRIVE THREE PINS IN HAMMER BLOCK SLIDE LATCH PIVOT SHAFT (34-9A) AND LOOSEN SCREW IN MULT LATCH KICK-OFF ARM (6-9A) AND REMOVE KEEPER FROM RIGHT END OF SHAFT. SLIDE SHAFT TO THE LEFT AND REMOVE THE THREE ARMS, MULT LATCH KICK-OFF ARM (6-9A) AND HAMMER BLOCK SLIDE LATCHES (24-9A).

REMOVE PIN FROM LEFT ARM. UNHOOK SPRINGS ON RIGHT END OF SHAFT. REMOVE FEATURE KEY RELEASE LINK (3-4). DISCONNECT LATCH OPERATING LINK (2-13) FROM REPEAT SHAFT ARM LATCH (4-13).

REMOVE KEEPER AT REAR OF DECIMAL PRINT HAMMER BLOCK ARM LINK AND DISCONNECT LINK. UNHOOK SPRING (8-13) LOCATED ON LEFT END OF REPEAT SHAFT ARM LATCH ASSEMBLY (4-13). UNHOOK SPRING FROM HAMMER BLOCK SLIDE LATCH RELEASE PAWL (28-9A). REMOVE KEEPER FOR PAWL (28-9A) AND REMOVE PAWL. SLIDE SHAFT TO RIGHT AND REMOVE SPACERS ON RIGHT AND LEFT SIDES OF REPEAT SHAFT ARM LATCH (4-13). DISCONNECT REPEAT SHAFT ARM OPERATING LINK (13-6) FROM STUD ON REPEAT SHAFT ARM (6-13). REMOVE REPEAT SHAFT ARM LATCH (4-13), DECIMAL PRINT BELLCRANK ASSEMBLY AND DECIMAL OPERATING BAIL LATCH (5-4).

REMOVING DIVISION SHAFT ASSEMBLY

UNHOOK SPRING FROM STUD IN RIGHT SIDE FRAME FOR AUTOMATIC TOTAL MULTIPLY LATCH RETAINING BAIL (5-6).

UNHOOK SPRING ON DECIMAL OPERATING BAIL. UNHOOK SPRING ON TOTAL KEY LOCK LINK STOP TRIP ARM, ALSO SPRING ON SUBTRACT ARM OPERATING BAIL AND SPRING ON SUBTRACT YIELD ARM TO BASE OF MACHINE. PUSH DIVISION SHAFT TO THE LEFT AND ALLOW RIGHT DIVISION SHAFT ARM TO HANG DOWNWARD. REMOVE WASHER LOCATED BETWEEN SUBTRACT ARM OPERATING BAIL AND DECIMAL OPERATING BAIL. REMOVE WASHER LOCATED BETWEEN TOTAL KEY LOCK LINK STOP TRIP ARM AND SUBTRACT YIELD ARM.

REMOVE AUTOMATIC TOTAL MULTIPLY LATCH RETAINING BAIL (5-6) AND SUBTRACT ARM OPERATING BAIL. REMOVE MOTOR DRIVE CONTROL ARM LINK. REMOVE AUTOMATIC REMAINDER LINK,

MODEL 99 DISMANTLING PROCEDURE

REMOVING DIVISION SHAFT ASSEMBLY CONT'D.

SPACER AND INNER LINK OF RIGHT DIVISION SHAFT ARM FROM SAME STUD AND REMOVE RIGHT DIVISION SHAFT ARM. REMOVE WASHER FROM STUD. REMOVE DECIMAL OPERATING BAIL. REMOVE WASHER FROM STUD, DISCONNECT SUBTRACT OPERATING ARM SPRING AND REMOVE ARM. REMOVE TOTAL KEY LOCK LINK STOP TRIP ARM AND SUBTRACT YIELD ARM. REMOVE SUBTRACT SLIDE SHIFT PLATE LIFT ARM (3-17). REMOVE DIVISION SHAFT DRIVE ARM.

REMOVE SCREW FROM CENTER OF DIVISION LEVER ASSEMBLY (10-10) AND REMOVE LEFT PORTION OF DIVISION LEVER WITH PRINTING HAMMER CATCH BLOCK ARM (12-10) AND LATCH OPERATING LINK (2-13). REMOVE TOTAL LOCK LINK.

REMOVING TWO COLOR RIBBON MECHANISM

REMOVE KEEPER AT RIGHT END OF RIBBON SHIFT BAIL. REMOVE KEEPER ON LEFT END, SLIDE SHAFT TO LEFT AND REMOVE RIBBON SHIFT BAIL ALONG WITH RIBBON GUIDE ASSEMBLIES.

REMOVE RIGHT RIBBON BRACKET.

REMOVE LEFT RIBBON BRACKET.

REMOVING HAMMER TRIP SHAFT

REMOVE KEEPER HOLDING HAMMER TRIP LINK. UNHOOK SPRING ON STOP SECTION RESTORING LINK. REMOVE PIN FROM ARM IN LEFT END OF HAMMER TRIP SHAFT. LOOSEN TWO COLLARS (6-14) HOLDING TYPE RACK LOCK BAIL (1-14) AND REMOVE KEEPERS HOLDING M & Q RACK SNUBBER ARM. SLIDE SHAFT TO RIGHT AND REMOVE SPACER JUST OUTSIDE LEFT FRAME.

REMOVE TOTAL SLIDE LOCK ARM WITH SPRING AND THE PINNED ARM. REMOVE TYPE CARRIER LIMIT LATCH (4-8) AND SPRING, SNUBBER ARM (5-8B) AND SPRING (6-8B). UNHOOK TYPE RACK LOCK BAIL SPRING (7-14). REMOVE TYPE RACK LOCK BAIL (1-14), TWO SET COLLARS (6-14), HAMMER TRIP ARM AND SPACER. REMOVE MOTOR DRIVE ARM.

REMOVING RIGHT SIDE FRAME

REMOVE KEEPER AND NON-PRINT BAIL LATCH LINK (5-12). DRIVE PIN OUT OF BACKSPACE RELEASE ARM (C-12) ON RIGHT END OF BACKSPACE SHAFT AND REMOVE ARM. (THIS PIN DRIVES OUT TOWARD REAR OF MACHINE.) UNHOOK CONSTANT LEVER DETENT SPRING.

REMOVE SUBTRACT BLOCK CAM FROM RIGHT END OF MAIN SHAFT. (THIS PIN DRIVES OUT TOWARD REAR OF MACHINE.) UNHOOK SPRING ON RIBBON FEED PAWL AND REMOVE KEEPER FROM RIGHT END OF RIBBON REVERSE SHAFT. REMOVE KEEPER ON DIVISION SHAFT LATCH FOR MOTOR CONTROL ARM LINK AND DISCONNECT LINK.

REMOVE KEEPER FROM FULL STROKE SPINDLE. UNHOOK SPRING ON DIVISION SUBTRACT SLIDE PAWL RAISE BELLCRANK ASSEMBLY (14-17). REMOVE KEEPER FROM STUD IN RIGHT SIDE FRAME AND REMOVE BELLCRANK (14-17). UNHOOK NON-PRINT BAIL RESTORING ARM ASSEMBLY SPRING FROM STUD ON INSIDE OF RIGHT SIDE FRAME. UNHOOK MAIN SPRING. REMOVE THREE SCREWS FROM RIGHT SIDE FRAME AND REMOVE FRAME. REMOVE CREDIT BALANCE HAMMER (23-18). UNHOOK REVOLVING SECTOR ARM DETENT SPRING AND SPRING OF NEGATIVE CHARACTER PRINTING ARM LATCH (22-18) FROM STUD IN CENTER FRAME. REMOVE KEEPER FROM STUD AND REMOVE THE ARMS AND SPACER. REMOVE KEEPER FROM LINK (4-15). LOOSEN SCREW IN FULL STROKE SPINDLE COLLAR AND REMOVE SPINDLE AND COLLAR. REMOVE REVOLVING SECTOR BRACKET SCREWS AND REMOVE REVOLVING SECTOR ARM AND SUBTRACT SLIDE (12-18). REMOVE EXTEND KEY LINK. REMOVE STOP SECTION RESTORING LINK. DISCONNECT RIBBON FEED LINK FROM MAINSHAFT DRIVE PLATE (1-15) BY REMOVING KEEPER.

MODEL 99 DISMANTLING PROCEDURE

REMOVING LEFT SIDE FRAME

REMOVE NUT, LOCKWASHER AND SPACER FOR TYPE CARRIER LIMIT LATCH AUXILIARY LATCH (15-8) AND REMOVE LATCH (15-8), TYPE CARRIER LIMIT LATCH RETAINING ARM (13-8), TWO BUSHINGS AND NEGATIVE MULTIPLY TYPE DRIVE ARM LATCH (2-8). REPLACE THE NUT AND SPACING WASHERS ON PIVOT SCREW.

REMOVE PIN IN BACKSPACE CAM (1-8) AND REMOVE CAM. REMOVE NON-PRINT LINKAGE (1-7) BY REMOVING KEEPER AND UNHOOKING SPRING. REMOVE KEEPER AND UNHOOK SPRING FROM REAR OF NEGATIVE TOTAL LINK (5-17) AND REMOVE LINK (5-17). REMOVE ACCUMULATOR LOCK AND LATCH RESTORING ARM. DISCONNECT SPRING AND KEEPER FROM STUD IN LEFT CHARACTER SHAFT ARM. DRIVE PINS IN TOTAL CAM AND WIPE PAWL SUPPORT ARM. (THESE PINS DRIVE OUT TOWARD REAR.) DISCONNECT SPRING ON RIBBON FEED PAWL. REMOVE KEEPER FROM LEFT END OF RIBBON FEED SHAFT. UNHOOK TYPE CARRIER RETAINING PAWL SPRING (6-8). REMOVE THREE SIDE FRAME SCREWS. UNHOOK NEGATIVE TOTAL LINK OPERATING ARM ASSEMBLY SPRING FROM STUD IN LEFT CENTER FRAME. REMOVE LEFT RIBBON FEED LINK AND ROLL FROM STUD IN TOTAL LOCK CAM. REMOVE KEEPER FROM LOWER STUD ON TOTAL SLIDE AND DISCONNECT FEED BACK CONTROL BELLCRANK SLIDE. REMOVE MULTIPLY MECHANISM MOUNTING GUIDE STUD (27-2) FROM BASE CASTING. THIS WILL PERMIT LOWERING BACKSPACER FAR ENOUGH TO REMOVE LEFT FRAME. DISCONNECT BLANK STROKE LOCK BELLCRANK LINK (7-17) FROM NEGATIVE TOTAL LINK BLOCK ARM, OUTER (6-17). REMOVE LEFT SIDE FRAME.

REMOVING CENTER SECTION MECHANISM

LOOSEN REAR TYPE RACK GUIDE COMB AND REMOVE TYPE RACKS. REMOVE TOTAL LOCK CAM. REMOVE ACCUMULATOR CAM BRACKET (10-16) AND ACCUMULATOR CAM. REMOVE CHARACTER STOP, .010 WASHER AND CHARACTER SELECTOR SHAFT. REMOVE ACCUMULATOR OPERATING PLATE, TOTAL BELLCRANK AND TOTAL LINK. REMOVE LATCH RESTORING PLATE AND LATCH RESTORING SHAFT.

REMOVE DIVISION BAIL (4-6) WITH SPRING AND INNER EXTENSION OF DIVISION LEVER. REMOVE CENTER TIE SHAFT SCREWS AND ACCUMULATOR SECTION UPLIMIT ROLLS.

REMOVE ACCUMULATOR SECTION HEXAGON TIE SHAFT AND ECCENTRIC ROLLS AND PLATES.

REMOVE ACCUMULATOR SECTION SUPPORT PLATES AND REMOVE ACCUMULATOR SECTION.

REMOVE INTERMEDIATE RACK GUIDE COMB BY REMOVING TWO SCREWS AND LOCKWASHERS. REMOVE HAMMER GUIDE COMB. REMOVE WIPE PAWL CAM AND SPACING WASHERS FROM LEFT END OF MAIN SHAFT.

REMOVE PAPER FEED LINK AND SUPPORT PLATE. LOOSEN SET SCREW IN TYPE CARRIER OPERATING CAM AND REMOVE MAIN SHAFT.

REMOVE KEEPERS FROM EACH END OF RACK RESTORING BAIL AND DISCONNECT FROM RACK RESTORING ARMS. REPLACE KEEPERS ON EACH END OF BAIL. THIS WILL PREVENT LOSING ROLLS ON BAIL. DRIVE PIN IN LEFT RACK RESTORING ARM AND REMOVE ARMS. (PIN DRIVES OUT TOWARD FRONT).

REMOVING CARRY LATCHES AND CARRY PAWLS

REMOVE CARRY LATCH SPRINGS. REMOVE CARRY PAWL LATCHES. REMOVE CARRY PAWLS, CARRY PAWL LATCH SUPPORT AND LATCH UPLIMIT SHAFT.

REMOVING CARRY LATCHES AND CARRY PAWLS CONT'D.

REMOVE CENTER MECHANISM SUPPORT (12-19). REMOVE CREDIT BALANCE BELLCRANK PAWL LIFT ARM (16-18). REMOVE ADDING RACK SLIDE GUIDE COMB BY REMOVING TWO SCREWS. REMOVE TYPE RACK INTERMEDIATE GEARS. REMOVE FRONT ACCUMULATOR RACK GUIDE BAR. REMOVE SCREW AND NUT FOR RACK RESTORING ACTUATOR ASSEMBLY (5-15). REMOVE STOP SECTION RESTORING GEAR SHAFT (7-12) AND NON-PRINT RESTORING ARM (9-12) BY REMOVING SCREWS. REMOVE PLUNGER (5-13) BY REMOVING COTTER KEY. REMOVE STOP SECTION RESTORING LINK GUIDE BRACKET BY REMOVING SCREWS. DRIVE PINS IN RACK RESTORING ACTUATOR SHAFT AND REMOVE ROLLER ASSEMBLY. REMOVE SCREW AND LOCK PLATES FROM RIGHT END OF REAR ACCUMULATOR RACK GUIDE BAR AND REMOVE ACCUMULATOR RACKS.

REPLACE ACCUMULATOR RACKS. REPLACE LOCK PLATES ON REAR ACCUMULATOR RACK GUIDE BAR. REPLACE FRONT ACCUMULATOR RACK GUIDE BAR. REPLACE INTERMEDIATE GEARS. REPLACE ROLLER ASSEMBLY BETWEEN CENTER FRAMES. REPLACE RACK RESTORING ACTUATOR SHAFT ASSEMBLY (5-15). DRIVE PINS IN ARMS ON SHAFT. CHECK FOR .010 END PLAY OF SHAFT ASSEMBLY BETWEEN CENTER FRAMES AND .010 END PLAY OF ROLLS BETWEEN ARMS ON SHAFT. CHECK ALIGNMENT OF ROLLS WITH RACK SLIDES. REPLACE STOP SECTION RESTORING LINK GUIDE BRACKET AND PLUNGER (5-13). REPLACE SCREW AND NUT FOR RACK RESTORING ACTUATOR ASSEMBLY (5-15). REPLACE STOP SECTION RESTORING GEAR SHAFT (7-12) AND NON-PRINT RESTORING ARM (9-12). REPLACE ACCUMULATOR RACK SLIDE GUIDE COMB. REPLACE CREDIT BALANCE BELLCRANK PAWL LIFT ARM (16-18). REPLACE CENTER MECHANISM SUPPORT (12-19). REPLACE CARRY PAWL LATCH SUPPORT (2-19) AND LATCH UPLIMIT SHAFT. REPLACE CARRY PAWL SHAFT (18-19) WITH BUSHING (17-19) IN CENTER WITHOUT CARRY PAWLS.

HAVE INSTRUCTOR EXPLAIN ADJUSTMENT OF CENTER SUPPORT (16-19).

REPLACE CARRY PAWLS, PLACING SEVEN CARRY PAWLS TO THE RIGHT OF THE CENTER SUPPORT, (16-19); THE HUBS OF THESE PAWLS WILL BE TO THE RIGHT. THEN PLACE BUSHING (17-19) AND EIGHT CARRY PAWLS TO LEFT OF CENTER; THE HUBS OF THESE PAWLS WILL BE TO THE LEFT.

REPLACE CARRY PAWL LATCHES, PLACING SEVEN LATCHES TO THE RIGHT OF THE SUPPORT (2-19). THE HUBS OF THE LATCHES GO TO THE RIGHT. THEN PLACE BUSHING (10-19) THROUGH CARRY PAWL LATCH SUPPORT (2-19) AND EIGHT LATCHES TO THE LEFT. THE HUBS OF THESE LATCHES GO TO THE LEFT. REPLACE LATCH SPRINGS. REPLACE HAMMER GUIDE COMB AND INTERMEDIATE RACK GUIDE COMB.

REPLACE RACK RESTORING BAIL AND ARMS. REPLACE ACCUMULATOR SECTION, ACCUMULATOR SECTION TIE SHAFT, ACCUMULATOR SECTION SUPPORT PLATES AND ECCENTRIC ROLLS. REPLACE DIVISION BAIL (4-6).

REPLACE ACCUMULATOR OPERATING PLATE, TOTAL BELLCRANK AND TOTAL LINK WHICH WERE DISMANTLED TOGETHER. REPLACE ACCUMULATOR CAM AND ACCUMULATOR CAM BRACKET (10-16). REPLACE CHARACTER SELECTOR SHAFT AND CHARACTER STOP, USING WASHER BETWEEN CHARACTER STOP AND CENTER FRAME. REPLACE LATCH RESTORING SHAFT AND LATCH RESTORING PLATE AFTER PLACING INNER EXTENSION OF DIVISION LEVER INTO POSITION.

REPLACE MAINSHAFT WITH TYPE CARRIER OPERATING CAM (8-8B) ON INSIDE OF LEFT CENTER FRAME WITH FLAT PORTION TOWARD FRONT OF MACHINE. REPLACE WIPE PAWL ASSEMBLY.

REPLACE ACCUMULATOR LOCK AND LATCH RESTORING ARM. PLACE TOTAL LOCK CAM ON LEFT END OF MAINSHAFT.

REPLACE PAPER CARRIAGE FEED LINK AND SUPPORT PLATE WITH SPACER AND SCREW.

REPLACE EXTEND KEY LINK. REPLACE STOP SECTION RESTORING LINK. REPLACE SUBTRACT SLIDE (12-18), REVOLVING SECTOR ARM AND FULL STROKE SPINDLE AND COLLAR. REPLACE NEGATIVE CHARACTER PRINTING ARM LATCH (22-18), SPACER AND REVOLVING SECTOR DETENT ARM ON CENTER FRAME STUD. REPLACE NEGATIVE CHARACTER PRINTING ARM (23-18), TYPE RACK LIMIT PLATE WASHER AND NEGATIVE CHARACTER PRINTING ARM SPACER. REPLACE TYPE RACKS AND SCREWS IN REAR TYPE RACK GUIDE COMB. CONNECT RIBBON FEED LINK TO MAINSHAFT DRIVE PLATE (1-15) WITH KEEPER.

REPLACING LEFT SIDE FRAME

AS LEFT SIDE FRAME IS REPLACED, HOOK LEFT RIBBON FEED LINK TO STUD OF TOTAL LOCK CAM, PLACE SPACER AND KEEPER ON STUD. PLACE NON-ADD LOCK LEVER LINK ON STUD IN LEFT ARM OF CHARACTER SELECTOR SHAFT. REPLACE KEEPER AND REHOOK SPRING. PLACE RIBBON RETAINING PAWL OVER STUD ON RIBBON FEED PAWL, REHOOK SPRING AND REPLACE KEEPER ON LEFT

REPLACING LEFT SIDE FRAME (CONT'D.)

LEFT END OF RIBBON SHAFT. PLACE ROLL ON LOWER STUD OF TOTAL SLIDE IN FRONT OF TAIL ON TOTAL CAM. PLACE LINK (7-17) ON OUTER NEGATIVE TOTAL LINK BLOCK ARM (6-17), REPLACE KEEPER. REPLACE THREE SIDE FRAME SCREWS. REPLACE FEED BACK CONTROL BELLCRANK SLIDE ON LOWER STUD OF TOTAL SLIDE WITH KEEPER. HOOK TYPE CARRIER RETAINING PAWL SPRING (6-8) AND NEGATIVE TOTAL LINK OPERATING ARM SPRING. REPLACE NON-PRINT LINKAGE (1-7), REPLACE KEEPER AND REHOOK SPRING. REPLACE BACKSPACE CAM (1-8) AND DRIVE PINS IN BACKSPACE CAM, TOTAL LOCK CAM AND WIPE PAWL SUPPORT ARM. TIGHTEN SET SCREW IN BACKSPACE CAM. REPLACE NEGATIVE MULTIPLY TYPE DRIVE ARM LATCH (2-8), TYPE CARRIER LIMIT LATCH RETAINING ARM (13-8) AND TYPE CARRIER LIMIT LATCH AUXILIARY LATCH (15-8) WITH TWO BUSHINGS, SPACER, LOCKWASHER AND NUT. REPLACE NEGATIVE TOTAL LINK (5-17) ON NEGATIVE TOTAL LINK OPERATING ARM AND REHOOK SPRING.

REPLACING HAMMER TRIP SHAFT

START SHAFT IN FROM RIGHT SIDE. PLACE SPACER, RIGHT HAMMER FIRING ARM, SET COLLARS (6-14) AND TYPE RACK LOCK BAIL (1-14) BETWEEN RIGHT SIDE FRAME AND CENTER FRAME. SLIDE SHAFT THROUGH RIGHT CENTER FRAME AND ON THROUGH TYPE RACK LOCK BAIL (1-14). PLACE M & Q RACK SNUBBER ARM (5-8B) AND TYPE CARRIER LIMIT LATCH (4-8). SLIDE SHAFT THROUGH LEFT CENTER FRAME. REPLACE LEFT HAMMER FIRING ARM AND TOTAL SLIDE LOCK ARM. PLACE SPACER BETWEEN LEFT SIDE FRAME AND TYPE CARRIER LIMIT LATCH (4-8). DRIVE PIN AND HOOK TOTAL SLIDE LOCK ARM SPRING.

REPLACE MOTOR DRIVE ARM.

REPLACING RIGHT SIDE FRAME

REPLACE SIDE FRAME WITH THREE MOUNTING SCREWS. CONNECT LINK (4-15).

PLACE KEEPER ON RIGHT END OF RIBBON REVERSE SHAFT. HOOK SPRING ON RIBBON FEED PAWL. HOOK MAINSPRING. HOOK NON-PRINT BAIL RESTORING ARM ASSEMBLY SPRING TO STUD ON INSIDE OF RIGHT SIDE FRAME. REPLACE DIVISION SUBTRACT SLIDE PAWL RAISE BELLCRANK (14-18) ON STUD ON RIGHT SIDE FRAME; HOOK ITS SPRING TO COTTER KEY IN BASE. CONNECT MOTOR CONTROL ARM LINK WITH DIVISION SHAFT LATCH. REPLACE SUBTRACT CAM ON RIGHT END OF MAINSHAFT. (PIN DRIVES TOWARD FRONT OF MACHINE.) REPLACE RELEASE ARM ON RIGHT END OF BACKSPACE SHAFT. DRIVE PIN TOWARD FRONT OF MACHINE. HOOK CONSTANT LEVER DETENT SPRING TO STUD IN RESTORING PLATE GUIDE BRACKET. REPLACE SPRING RETAINER ON STUD OF NON-PRINT BAIL LATCH (4-12). CONNECT NON-PRINT BAIL LATCH LINK (5-12) TO NON-PRINT BAIL LATCH (4-12) AND RELEASE ARM (C-5). REPLACE TOTAL LOCK LINK.

REPLACING DIVISION SHAFT ASSEMBLY

REPLACE DIVISION LEVER (10-10) WITH LATCH OPERATING LINK (2-13) AND ATTACH WITH SCREW TO INNER EXTENSION. PLACE DIVISION DRIVE ARM IN PLACE. PLACE SUBTRACT YIELD ARM IN MACHINE, THEN SUBTRACT OPERATING ARM, PLACING ITS LINK OVER STUD OF MOTOR TRIP BELLCRANK AND PLACE SPACING WASHER ON THIS STUD. REPLACE DECIMAL OPERATING BAIL, ATTACHING ITS LINK TO SAME STUD. REPLACE SUBTRACT SLIDE SHIFT PLATE LIFT ARM (11-17) & TOTAL LOCK LINK STOP TRIP ARM. PLACE SPACER BETWEEN THIS ARM AND SUBTRACT YIELD ARM. REPLACE SUBTRACT ARM OPERATING BAIL (23-5A), PLACING SPACER BETWEEN DECIMAL BAIL AND SUBTRACT ARM OPERATING BAIL. REPLACE RIGHT DIVISION SHAFT ARM, ATTACHING INNER LINK AND AUTOMATIC REMAINDER LINK TO STUD IN MOTOR TRIP BELLCRANK WITH SPACER IN BETWEEN AND PLACE KEEPER ON STUD. REPLACE AUTOMATIC TOTAL MULTIPLICATION

REPLACING DIVISION SHAFT ASSEMBLY CONT'D.

LATCH RETAINING BAIL (5-6). ASSEMBLE SPACER AND NUT ON DIVISION SHAFT. WHEN REPLACING DIVISION SHAFT, MOVE IT TO RIGHT, FLUSH WITH LEFT CENTER FRAME.

REPLACING FEATURE KEY LATCH SHAFT

SLIDE SHAFT THROUGH FROM RIGHT SIDE, PLACING DECIMAL OPERATING BAIL LATCH (5-4), DECIMAL PRINT BELLCRANK ASSEMBLY (14-6), REPEAT SHAFT ARM LATCH ASSEMBLY (4-13) AND SPACERS ON SHAFT. ATTACH DECIMAL BLOCK ARM OPERATING LINK AND REPEAT SHAFT ARM OPERATING LINK (13-6). REHOOK SPRING (8-13) ON LEFT END OF REPEAT SHAFT ARM LATCH (4-13) TO COTTER KEY IN BASE. PLACE SPACER AND LEFT ARM ON LEFT END OF SHAFT AND DRIVE PIN. REPLACE HAMMER BLOCK SLIDE LATCH RELEASE PAWL (28-9A). HOOK SPRING. REHOOK SPRINGS FOR DECIMAL OPERATING BAIL LATCH (5-4) AND AUTOMATIC REMAINDER LINK LATCH. CONNECT LINK (2-13) TO LATCH (4-13) WITH KEEPER.

REPLACING HAMMER BLOCK SLIDE LATCH MECHANISM

REPLACE HAMMER BLOCK SLIDE LATCH PIVOT SHAFT (34-9A), PLACING HAMMER BLOCK SLIDE LATCHES (24-9A), THREE ARMS AND MULT LATCH KICK-OFF ARM (6-9A) ON SHAFT. DRIVE PINS IN ARMS AND REPLACE KEEPER ON RIGHT END OF SHAFT. REPLACE HAMMER BLOCK SLIDE LATCH BAIL (23-9A). REPLACE HAMMER BLOCK SLIDE LATCH RELEASE BAIL SHAFT (33-9A) WITH TWO KEEPERS. REPLACE HAMMER BLOCK SLIDE LATCH BAIL PIVOT SHAFT WITH THREE KEEPERS. REPLACE MULT LATCH KICK-OFF LINK (5-9A). HOOK HAMMER BLOCK SLIDE LATCH SPRINGS (25-9A). REPLACE SPACE-OVER BELLCRANK SHAFT ASSEMBLY (4-9). REPLACE KEEPERS AND DRIVE PIN. (PIN DRIVES UPWARD.)

REPLACING STOP SECTION

PLACE STOP SECTION IN MACHINE AND PUT REAR RAIL IN POSITION. REPLACE FRONT STOP SECTION RAIL. CONNECT STOP SECTION LINK WITH RESTORING ARM. HOOK STOP SECTION SPRING. PLACE SCREW IN RIGHT END OF REAR RAIL AND DIVISION CONTROL ARM PIVOT SCREW AND WASHER IN LEFT END OF REAR STOP SECTION RAIL. REPLACE NON-ADD LINK (21-9A). REPLACE MULT TOTAL LINK (19-9A). REPLACE MULT TOTAL KEYSTEM (1-9) AND SCREW STUD (N-9) IN KEYSTEM.

REPLACING KEYBOARD

WHEN REPLACING KEYBOARD, PLACE ROLL ON NON-ADD RELEASE LINK IN RACEWAY OF TOTAL LOCK CAM. PLACE NON-ADD BELLCRANK (5-16) TO REAR OF REAR STOP SECTION RAIL. PLACE SUB-TOTAL BELLCRANK (1-16) TO LEFT OF TOTAL LINK. PLACE MULT TOTAL KEYSTEM (1-9) IN SLOT OF UPPER KEYBOARD PLATE. PLACE STUD IN SUBTRACT OPERATING ARM IN SLOT OF KEYSTEM. PLACE NUMERAL KEY LOCK IN SLOT OF LOWER KEYBOARD PLATE UNDER UNIVERSAL BARS. PLACE BLANK STROKE LOCK SHAFT IN HOLE IN SIDE FRAME AND LOWER KEYBOARD PLATE AND REHOOK TOTAL LOCK LINK. REPLACE TOTAL YOKE. CONNECT TOTAL LINK AND TOTAL SLIDE TO TOTAL YOKE. HOOK SUB-TOTAL LATCH SPRING. REPLACE TOTAL YOKE PIVOT SHAFT, BLANK STROKE LOCK ARM AND LOCK PLATE LINK BELLCRANK WITH FLANGED BUSHING AND SPACER. REPLACE KEYBOARD MOUNTING SCREWS. REPLACE STOP SECTION CONTROL SLIDE ASSEMBLY (8-5) AND BACKSPACE AND CORRECTION SLIDE PLATE, PLACING ESCAPEMENT ARM (2-5) IN HOLE ON RIGHT END OF SLIDE. REPLACE STOP SECTION CONTROL SLIDE LATCH (7-5), USING SCREW AND SPRING. SLIDE DIVISION SHAFT TO LEFT AND REPLACE LEFT DIVISION ARM. DRIVE PIN IN ARM. HOOK NEGATIVE TOTAL LINK (5-17) TO SUBTRACT SLIDE SHIFT PLATE LIFT ARM (3-17). REPLACE MOTOR BAR AND DECIMAL KEY. REPLACE CORRECTION SLIDE AND BACKSPACE SLIDE AND SLIDE LIMIT PLATE. HOOK SPRING ON LEFT OF SLIDE (8-5) TO LIMIT PLATE. REPLACE UPPER AND LOWER MARCEL LINKS AND BLANK STROKE LOCK BELLCRANK.

REPLACING KEYBOARD (CONT'D.)

REPLACE TYPE RACKS. REPLACE AIR CHECK.

REPLACE NEGATIVE MULTIPLY ARM LATCH SUPPORT BRACKET (18-2).

REPLACE RIBBON MECHANISM. PLACE CARRIAGE ON MACHINE AND RUN 93 AND CREDIT BALANCE TESTS.

REMOVE NEGATIVE MULTIPLY ARM LATCH SUPPORT BRACKET (18-2).

REPLACING UNIVERSAL DRIVE SHAFT

SLIDE SHAFT IN FROM RIGHT SIDE WITH NEGATIVE MULTIPLY TYPE DRIVE BAIL (6-5) IN PLACE. PLACE ARM (P-10) IN CENTER OF SHAFT. PLACE COLLAR BETWEEN OUTSIDE OF LEFT FRAME AND NEGATIVE MULTIPLY TYPE DRIVE BAIL (6-5). PLACE NEGATIVE MULTIPLY MECHANISM MOTOR DRIVE ARM (25-8A), NEGATIVE MULTIPLY CUT-OUT ARM (13-9) AND UNIVERSAL SHAFT DRIVE ARM (27-8A) WITH WASHER ON LEFT END OF SHAFT AND DRIVE PINS.

REPLACE BACKSPACE DRIVE ARM WITH DRIVE PAWL (10-5). REPLACE NON-PRINT BELLCRANK RESTORING ARM (23-2).

REPLACING PRINTING HAMMER CATCH SHAFT ASSEMBLY

THE PRINTING HAMMER CATCH SHAFT WITH THE RIGHT ARM PINNED TO IT WAS REMOVED TOGETHER. PLACE THE RIGHT ARM OF THE MULTIPLICATION AND DIVISION NON-PRINT BAIL (3-12) ON SHAFT; THEN THE INNER RIGHT ARM. PLACE THE HUB OF THIS ARM TOWARD THE RIGHT. SLIDE SHAFT THROUGH RIGHT CENTER FRAME AND LEFT ARM OF MULTIPLICATION AND DIVISION NON-PRINT BAIL (3-12). PLACE THE RIGHT ARM OF THE PRINTING HAMMER CATCH ASSEMBLY (13-10) AND COLLAR ON SHAFT AND SLIDE SHAFT THROUGH LEFT CENTER FRAME AND THROUGH CENTER ARM OF PRINTING HAMMER CATCH ASSEMBLY (13-10). THEN REPLACE AUTOMATIC TOTAL MULTIPLY RELEASE BELLCRANK (3-6).

REPLACE THE LEFT ARM WITH HUB TOWARD THE RIGHT. SLIDE SHAFT ON TO THE LEFT AND THROUGH LEFT ARM OF PRINTING HAMMER CATCH ASSEMBLY (13-10). REPLACE SPRING RETAINER AND KEEPER ON RIGHT END OF SHAFT AND TIGHTEN ALLEN SCREWS.

HOOK SHORT LINK (1-6) CONNECTING LATCH "A" TO AUTOMATIC TOTAL MULTIPLY LATCH RELEASE BELLCRANK (3-6).

CONNECT PRINTING CONTROL BAIL CONNECTING LINK (10-12) TO BAIL (3-12) AND REHOOK SPRING (12-12). HOOK SPRING (13-12) ON PRINTING CONTROL BAIL (3-12) AND SPRING (14-10) ON PRINTING HAMMER CATCH ASSEMBLY (13-10). HOOK SPRING TO RIGHT RIBBON BRACKET. HOOK OUTER SIMPLA-TAPE BAIL LATCH SPRING.

REPLACING MISCELLANEOUS PARTS

REPLACE MULTIPLY NON-PRINT SLIDE (18-7) ON STUD IN SIDE FRAME. REHOOK SPRINGS (3-7) AND (4-7).

REPLACE ZERO MULTIPLY TYPE DRIVE SLIDE (31-8A) AND REHOOK SPRING. REPLACE DIVISION INTERLOCK ARM LATCH (4-10) AND LINK (2-10). REHOOK SPRING (3-10).

REPLACE STUD (27-2) IN BASE. REPLACE LIMIT ARM (11-8A) AND NEGATIVE MULTIPLY MOTOR DRIVE SLIDE (28-8A) ON STUD (27-2). REHOOK SPRINGS. REPLACE NEGATIVE MULTIPLY LATCH

REPLACING MISCELLANEOUS PARTS (CONT'D.)

ARM SUPPORT BRACKET (18-2) ON LEFT FRONT CORNER OF KEYBOARD. REHOOK DIVISION INTERLOCK LATCH SPRING (3-10). REPLACE HAMMER BLOCK SLIDE LATCH DRIVE ARM (17-9A) AND REHOOK SPRING (35-9A). REPLACE NEGATIVE MULTIPLY TYPE DRIVE CAM ASSEMBLY (12-8) AND NEGATIVE MULTIPLY OPERATING ARM (16-5A) ON LEFT END OF DIVISION SHAFT. REPLACE SPACER AND KEEPER. PLACE SPACER BETWEEN ARM (11-8) AND SLIDE (12-8).

REPLACE NEGATIVE MULTIPLY TYPE DRIVE CAM RETURN PAWL (18-8A), SPRING (37-8A) AND SPACER ON BACKSPACE CAM. REPLACE NON-PRINT RESTORING ARM PAWL (24-2). REPLACE UNIVERSAL SHAFT DRIVE LINK (26-2). REPLACE MULTIPLY MECHANISM OPERATING SLIDE (28-2) ON STUD (27-2). CONNECT LINK (Q-5) TO NEGATIVE MULTIPLY OPERATING ARM LATCH RELEASE. REPLACE AUTOMATIC TOTAL MULTIPLY BAIL LATCH LINK (6-6) WITH ITS ELONGATED END ATTACHED TO AUTOMATIC TOTAL MULTIPLY LATCH BAIL (5-6).

REPLACE HAMMER CATCH SHAFT LATCH ASSEMBLY (20-5A) AND TRUNION NUT ON RIGHT END OF RESET GEAR ASSEMBLY. HOOK ITS SPRING TO STUD IN SIDE FRAME.

REPLACE KEYSTEM LOCK RELEASE ARM (8-1), MOTOR DRIVE CONTROL ARM LATCH ASSEMBLY (5-1) AND MOTOR DRIVE BELLCRANK LATCH ASSEMBLY (17-1) ON BLANK STROKE LOCK BELLCRANK PIVOT STUD AT RIGHT FRONT CORNER OF MACHINE. RETAIN WITH SCREW.

REPLACE MULTIPLY KEY RETURN BAIL OPERATING LINK (2-4). THIS LINK ATTACHES TO FEATURE KEY LATCH (5-4).

REPLACE AUTOMATIC TOTAL MULTIPLY LATCH (7-6) WITH PIVOT SCREW ON RIGHT END OF REAR STOP SECTION RAIL.

REPLACE MULTIPLY AND MOTOR DRIVE CONTROL CONNECTOR LINK (10-1) AND AUTOMATIC TOTAL MULTIPLY MOTOR DRIVE LATCH LINK (12-6) ON AUTOMATIC TOTAL MULTIPLY LATCH PIVOT SCREW.

REPLACE MULTIPLICATION AND DIVISION INTERLOCK BAIL OPERATING LINK (11-10). THE REAR END OF THIS LINK ATTACHES TO THE PRINTING HAMMER CATCH ASSEMBLY (13-10).

REPLACE MULTIPLY UNIT ON MACHINE. TO DO THIS, ESCAPE STOP SECTION TO EXTREME LEFT AND RELEASE SLIDE (8-5) FROM LATCH (7-5). PLACE MULTIPLY KEYSTEM INTERLOCK PAWL (M-10) TO REAR OF STUD (R-10). PLACE ARM (6-7) UNDER EXTENSION (A-7) ON NON-PRINT SLIDE (18-7).

REVERSE PROCEDURE AS EXPLAINED IN DIS-MANTLE PROCEDURE, PAGE 65.